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PRESIDENT'S ADDRESS

SOME FUNDAMENTAL ELEMENTS IN THE ADVANCEMENT OF MEDICINE.*

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THEODORE ROOSEVELT is well-known as a great statesman, fighter, big game hunter, explorer and forceful writer. What he accomplished and what he was is a matter of history—but why? There were undoubtedly many factors which contributed to his success—his personality, energy, ability to acquire knowledge, to form opinions (make a diagnosis), and to convince others. A study of his boyhood days, as described by his biographers, shows us that he had two hobbies which he pursued with constancy and with all his energy. One hobby was the study of natural history, especially ornithology, and the other was reading. These hobbies were not mere whims, but were taken seriously by him as a boy. They were his chief vocations then. In later years they furnished him with much recreation and pleasure, were never neglected, and in all of his undertakings were deliberately planned for.

At the age of ten he opened a room in his home which he called "The Roosevelt Museum of Natural History," and he later learned how to skin and stuff birds. At the age of fourteen, when making a trip up the Nile with his parents, he was much more interested in the birds than in the wonders of Egypt. He makes no mention of the pyramids in his writings, but records with enthusiasm that he found

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at Cairo a book which greatly helped him, written by an English clergyman whose name he forgot, on the ornithology of the Nile. At the end of his freshman year at college he with H. D. Mills published a catalogue of the summer birds of the Adirondacks, in Franklin County, New York. He was elected president of the Natural History Society of Harvard. William Roscoe Thayer, in analyzing his career at Harvard, states that "he did fairly well in several unrelated subjects, but achieved prominence in one, natural history." Roosevelt hoped then to become a professor of natural history, but later gave up this plan in order to go into politics.

His great interest in birds during his later years is well shown by the following incident related by Sir Edward Grey in his address on recreation before the Harvard Union, December 8, 1919. While Roosevelt was still president of the United States, Sir Edward Grey received a letter from Mr. Bryce, who was the British Ambassador at Washington during Roosevelt's administration, stating that President Roosevelt intended to travel as soon as he was out of office. "He was going to travel in Africa, to visit Europe, and to come to England, and he was planning his holiday so minutely as to time his visit to England for the spring, when the birds would be in full song and he could hear them. For this purpose he wanted it to be arranged that somebody who knew the songs of the English birds should go for a walk with him in the country, and as the songs were heard, tell him what the birds were." Roosevelt carried out his plans and in May of the year 1910 he spent a day with Sir Edward Grey, who was also an ornithologist, studying English birds and their songs.

The details of this trip alone with Sir Edward Grey are delightfully told by the latter in the above-mentioned address. Roosevelt's sister also refers to this trip in the biography of her brother. In his letters to her he wrote with enthusiasm of the reception given him in England, but most of all he wrote with keen delight of his "bird walk" through the New Forest and over the adjacent lowlands and uplands, with that fellow bird lover, the secretary of foreign affairs, then Sir Edward, now Earl, Grey.

In the study of ornithology as a boy he learned to observe, record observations, apply himself in mastering the subject, and draw his own conclusions. The mastering of that one subject was a wonderful training in learning how to master others. In the study of living birds he realized the importance of the conservation of the natural resources of this country, for the sake of birds and for man. He was a greater statesman because he was a great ornithologist and naturalist.

I believe four factors were largely responsible for his success in life: first, his personality; second, his energy and persistence; third, the training in learning how to acquire knowledge derived in large

part from his pursuit of ornithology; and fourth, his ability to impress people with his thoughts by his convincing speaking and forceful writing, i.e., his ability to use the English language.

The hobbies of Roosevelt were of great value to him as a statesman; the same ones would likewise be of great value to a physician, for the habits and methods of observation, of recording observations, and arriving at a diagnosis in the study of ornithology could easily be applied to the study of medicine, both ornithology and medicine being branches of biology. Physicians, as well as statesmen, should know how to use the English language.

THE INFLUENCE OF HOBBIES IN GENERAL, AND ESPECIALLY BIOLOGICAL ONES

Every child likes that form of recreation for which he is best fitted, and by application he may become very proficient and excel his comrades. This often becomes his hobby and is a most important factor in his development. Likewise in his school work he prefers the subjects for which he is best adapted and these become hobbies, even a form of recreation, as compared with others, which he dislikes because they are difficult for him to acquire and in which it seems impossible for him to become proficient. The hobbies of a boy need to be harnessed. At times they should be given free rein and encouraged, in order that he may acquire the methods and habits of attaining success in one subject. This he finds is accomplished by intelligent application and "sticktoitiveness." At other times they should be curbed, in order that they may not interfere with other important duties. The mastering of one subject teaches him how to master others.

What applies to the boy also applies to the man. Nearly every business or professional man has two sets of hobbies, one extramural (outside of his business or profession), and the other intramural (a part of his business or professional duties). The latter hobby is that particular phase of his work in which he is most proficient and which he enjoys doing, even finding it a source of recreation as compared with other phases of his work, to which he is ill-adapted and which he realizes that he does less well.

Extramural hobbies are of many varieties, such as literature, art, music, golf, tennis, fishing, hunting, gardening, collecting of all kinds from stamps to antique furniture, and the study of the various branches of natural history. Men are serious in the pursuit of these hobbies, the golf enthusiast arranges his professional and business duties so that he may play golf, the fisherman or hunter fishes or hunts for only a few days or weeks in the year, but spends a great portion of the year in planning for the next trip. He lives in recollection of former trips and in the anticipation of those to come. The collector

is constantly arranging and enjoying his collection and planning for the acquisition of new material. The most intimate friendships are often founded on a common hobby.

Hobbies must be taken seriously, for they are not only an important source of recreation, but are also an important factor in the education and training of the individual. He puts his best efforts into the pursuit of his hobby and unconsciously forms habits and methods which may be of great value in his business and professional career.

Natural history offers a wonderful group of subjects in which children and adults may find hobbies, for intensive specialization, or just for the pleasure of dabbling in them as opportunity and mood may come together. There are also hobbies which may be enjoyed to their utmost wherever the individual may be, and especially near his home. They supplement all outdoor recreations, as hunting, fishing, canoeing, walking, camping, golf, motoring, and give an added zest to all of these.

Plants have been collected and cultivated for ages, not only for the scientific interest in plants themselves, but also for the purpose of finding plants valuable as food, medicine, economic purposes, and decoration. Many of the older physicians were interested in botany in order to acquire remedies for use in their profession, and also with the hope of finding some previously unknown cure for disease. Dr. Howard A. Kelly has presented us with a very attractive volume entitled, "Some American Medical Botanists." In the introduction of this book he states that his contribution grew out of a lifelong interest in botany. Many present day physicians are interested in botany; some as collectors, enjoying the outdoor recreation of gathering flowers and later analyzing them at home, the outdoor recreation being of physical benefit to them and the study and analysis of the specimens being of educational value in forming similar habits in the study of disease. Others are investigators, studying wild plants in their natural habitats or transferring them to their gardens. Gardening is a wonderful source of relaxation and education in the cultivation of plants and the study of their diseases. The principles of medicine may be applied to gardening, and vice versa. One of our well-known surgeons has successfully applied the principles of surgery to the grafting of trees. The bacteriologist has taught the nurseryman that if he fails to cleanse his knife he may transfer blights due to bacteria to other trees, or branches of the same tree, and the infection resulting will mar his work just as it mars the surgeon's efforts. The botanist who collects answers the question *what*—and can always remain a botanist, but the one who studies the life history of plants and their struggle for existence, who answers the question *why*, must become a naturalist in the broadest sense of the word.

The older ornithologists gathered their specimens as the botanist gathered his plants, and analyzed them. They have furnished most valuable scientific knowledge, and in the analysis of the gastric contents of birds they have helped determine which birds are beneficial and which are injurious to man. The present day laws fortunately prevent the indiscriminate killing of birds beneficial to man. The present day ornithologist studies birds in the field, using a binocular in order to bring the object almost within his reach. Clinical observations have replaced the laboratory with its study of the dead specimen. In order to identify the bird he has to observe it in its natural surroundings and unconsciously he learns its habits and the *why* of its existence.

The older entomologists gathered their specimens, identified them, carefully prepared, classified, and arranged them in rows in sealed cabinets to protect them from moths—but in recent years living insects have been carefully studied in order to determine their life history and their relation to the rest of the world and especially to man. The knowledge acquired from such studies in determining the transmission of certain diseases marks some of the greatest contributions in medicine.

The other branches of biology offer just as attractive fields for recreation and study as those I have mentioned. Biology is the study of living beings, both plant and animal, including man, and medicine is but one of its many branches. Human embryology, anatomy, physiology, bacteriology, pathology, pharmacology, and clinical medicine are subjects which in their pursuit differ in no way from similar subjects in botany and in the study of animal life, other than man. The training in one branch fits one for the study of the other branches. The child who follows natural history as a hobby is already preparing himself for the study of medicine. The physician who has any of these branches for a hobby is unconsciously making himself a better physician.

There are two varieties of naturalists, the collector and the investigator. One answers the question *what* and the other the question *why*. A very good example of the former is shown by the following incident: In July, 1907, I went to Newfoundland. I did not have any definite plans other than to get away from work and possibly find a good recreation ground. On board the steamer from Boston I met two men also bound for Newfoundland, one a lawyer and the other a principal in a boys' school. They told me that they had planned to go up the Humber River as far as the Big Falls to fish for salmon. Salmon fishing in the summer and caribou hunting in the fall are the chief attractions offered by Newfoundland to those desiring recreation. As we became better acquainted they confessed

that the real object of their trip was not salmon fishing, but to collect beetles, and they were especially anxious to obtain some specimens of the species carabus meander. As a boy I had been interested in entomology, especially moths and butterflies, but I soon found that we had very little in common; for they were distinctly coleopterists and very highly specialized ones, having very little interest in any insect outside of that group. I have never seen collectors so intense and thorough as they. At every opportunity, (and from Boston to Humbermouth, Newfoundland, the opportunities were many), they hunted for beetles. At Humbermouth I procured a guide and some provisions and went up the Humber River to the Big Falls, expecting to see them there later. I did not meet them until my return home, on the steamer from Hawksberry, Cape Breton, to Boston. My first question was, "Did you find carabus meander?" With great satisfaction one of the coleopterists produced from his pocket a bottle containing two or three specimens of this beetle. They did not risk carrying the much-prized specimens in their baggage. I next asked, "Where did you find them?" expecting that they were procured in the cliffs about the Big Falls of the Humber, or in the bogs of the interior. But no, they were found beneath stones or boards in the back yard of the house in which they had spent their first night in Newfoundland! It was distinctly backyard entomology. The back yard is an ever present and ever fertile, though oft neglected, field in all scientific research. I do not remember whether or not they reached the Big Falls of the Humber, or caught any salmon—and I have even forgotten the names of the coleopterists.

These two coleopterists emphasized the value of thoroughness and nearby methods in collecting. They literally left no stone unturned in searching for the object desired. They were distinctly collectors, and most interested in what a specimen was and where it could be procured. The *why*, the life history of the beetle, and its relation to the world in which it lived, was of little interest to them. The contributions of a collector are of value, but not as great as that of an investigator. The coleopterist who remains a collector of beetles can always remain a coleopterist, but as soon as he attempts to solve the life history of a species and answer the question *why*, he must broaden out and become a naturalist. I have been unable to find an account of the life history or the *why* of the carabus meander, but a very interesting description of the habits of another species of that genus (the carabus auratus—the golden gardener) may be found in "Social Life in the Insect World," by J. H. Fabre. The methods employed by Fabre in the study of insects could be used to advantage by the scientific investigator in medicine.

MEDICAL EDUCATION

One of the most important duties of the medical profession is that of medical education, our own education and that of others—students, nurses and the public, in order that all may cooperate in the study, diagnosis, treatment and prevention of disease. All phases of this problem have deservedly received so much attention in recent years that one hesitates to add to the splendid and costly structure already created. It is not to the superstructure of medical education that I wish to add, but rather to the elements forming its very foundation, and with particular reference to the training and education of the physician of the future. The child, the possible future physician, must learn to observe closely, think clearly, and be able to convey what he has learned to others. In order to accomplish this I wish to emphasize the importance of hobbies in the study of natural history, as a means to this end—the living book of the great out-of-doors, with its fields, woods and streams, as a source of recreation and unconscious development in the clinical study of plant and animal life, and the future study of medicine. The drawing of specimens obtained on these trips teaches the child to observe the more closely, and furnishes records of things observed. To convey this knowledge to others he must also write and speak clearly. Emphasis on the teaching of natural history, English, and drawing, in the primary grades of our schools, would be appreciated by such a child as a definite means to a better understanding and expression of things observed out-of-doors. A reason is found for classroom work and an intimate relation is established between the school (laboratory) and living (clinical) branches of biological (medical) education. Hobbies in natural history, English, and drawing are the very foundations for better physicians, better citizens and better presidents, and as such should be followed and utilized during the entire life of the individual who is interested in natural history. They should be included in the curriculum of schools of all grades, including our colleges.

Much discussion has arisen in recent years as to what the recent college graduate should have acquired from his alma mater. It seems to me that there are certain things, at least, that a college education should accomplish for those students who attempt to profit by the opportunities afforded them, namely:

1. Enable the student to "find himself"—to determine what he is best fitted to do, or what he may do fairly well. This is not necessary in all cases, as some students enter college with a definite idea as to the work they are to do after graduation.

2. Give him further experience in the application necessary for the comprehension of any subject and in the analysis of information gained, in order to form opinions.

3. Help him to acquire a working foundation especially suited to his future work.

4. Teach him how to speak and write the English language.

It is not my purpose to belittle the value of the study of ancient languages as a means to a better knowledge of our own, or of foreign languages that we may keep abreast of the literature on any subject; or of mathematics as a training in mental gymnastics, or of such important sciences as physics and chemistry, but rather to emphasize the importance of a continued study by the future physician of the various branches of biology (of which medicine is but a part), and the means of expressing this knowledge in English and drawing; and finally the correlation of laboratory and living (clinical) studies, that the student may appreciate the value of each and the inseparability of both.

To this end I would insist that every premedical college course should include the following:

1. Special instruction in clinical biology, or natural history, with the requisition that each student shall present a thesis on some phase of the life history or social relations of some species of plant or animal, based on his own observations.

2. Special attention in speaking and writing the English language. I cannot emphasize this too strongly, because there are many physicians who are college graduates, with years of study of Latin or Greek, or both, and who are also graduates of medical schools requiring for their admission a reading knowledge of French and German, and yet they have never been required to learn the use of their own language.

3. Instruction in freehand drawing, especially drawing objects observed in biological studies. College students are requested to make drawings of objects observed in the courses in biology, and medical students are also requested to make similar drawings in their courses in anatomy, histology and pathology, without ever having had any instruction in the art of drawing, especially as applied to these subjects.

The biologist may be interested in only one branch of biology and in only one phase of that branch. Some graduates in medicine are interested in only one branch of medicine and in only one phase of that branch, but most physicians are clinicians who utilize the laboratory branches as a means to a better understanding of their clinical work, or in order that someone else shall make their diagnoses for them.

The so-called basic sciences, anatomy, physiology, chemistry and pathology, deservedly form a most important part in the curriculum of the first two years of our medical schools. They are all indispensable for a better foundation in the study, diagnosis, treatment and

prevention of disease, but they are inseparable from each other and from clinical medicine. In order to be appreciated as such there must be a closer relation between them and clinical medicine, not only as they are taught in the medical schools, but also in clinical work after graduation. The lack of interest, by many clinicians, even recent graduates from our very best medical schools, in that most important basic science, pathology, is most deplorable and is a reflection either on the fundamental fitness of the individual for his chosen profession, or on the manner in which pathology was presented to him when a medical student. The clinician, especially the surgeon, has a wonderful opportunity to study living pathology, which the laboratory worker unfortunately rarely sees, except in experimental work on the lower animals. To do their best work and make their greatest contributions, clinicians should be fundamentally and eternally pathologists, and pathologists should, at least occasionally, be clinicians.

I believe there is another great danger confronting clinicians and medical students, at the present time. The finer diagnostic laboratory methods, especially the x-ray, are among the greatest contributions to clinical medicine in recent years, but we should be careful that they do not dim our vision, benumb our tactile sense, dull our hearing, and weaken our reason. Keen observation, appreciative palpation, percussion and auscultation, and also the responsibilities of making one's own diagnosis, have been and ever will be the fundamental methods in the study and diagnosis of disease. These are always available and they must be most zealously safeguarded from neglect, both in the teaching and in the practice of medicine.

THE AMERICAN GYNECOLOGICAL SOCIETY

The constitution of the American Gynecological Society states that its object is to promote all that relates to the diseases of women, obstetrics and abdominal surgery. The society has a large and a most important field. The individual who is fortunate enough to be head of the department of obstetrics or gynecology, or of both subjects, in a medical school or hospital, has a great opportunity and an even greater responsibility—the two are inseparable. He should be a good executive, clever diagnostician, skillful operator, an excellent teacher, either himself a laboratory worker or so well versed in these subjects that he can intelligently direct these important branches, and finally he should be a "producer" and make contributions to our knowledge of obstetrics and gynecology. The men who excel in all of these important branches of their department are rare. Fortunate indeed is the medical school or hospital which has at the head of these departments one who executes all of his duties fairly well and excels in a few branches, or even one. The branch in which he excels is, or should be, his hobby, but un-

fortunately his responsibilities often crowd out the opportunity to develop this hobby to its utmost. He realizes that he is judged not by his strength, but by his weakness, and often spends most of his time and energy in work which he is ill-fitted to do, and in which he can never make any real contribution, at the expense of the branch or branches he does well. If he is a producer he is apt to attempt to make contributions on many subjects, rather than to stick to the field in which he excels. He is afraid of public opinion and desires to appear versatile.

I believe it is the duty of every man to make the most of his best talents, for that is the only way he can make his greatest contributions. The work to which he is ill-adapted should be turned over to his associates, and he should be satisfied with a moderate proficiency in these branches. He may be accused of exaggerating the importance of his hobby, and of neglecting other subjects, but that is of minor importance compared with the failure to make the most of the best that he has. These criticisms are temporary, but his real contributions are lasting. The individual is hampered by his responsibilities and by his limitations. A society such as ours is more fortunate, both in its responsibilities and its opportunities, since it is able to meet responsibilities with opportunity. It contains men who excel in executive ability, diagnosis, operating, teaching and laboratory work. It desires their best efforts, each man according to his talent. If members will make the most of their individual ability, the society should be lenient with their shortcomings. I believe that it is of the greatest importance to the society that the fellows present their best contributions at our meetings, in order that the society may share the credit of these and that the published transactions may contain the best that American gynecology and obstetrics have accomplished.

CONCLUSION

The future of gynecology and obstetrics is inseparably united with that of medicine as a whole, and the greater the advancement of medicine the greater the need of specialization, but always in close contact with its other departments. The future of medicine is likewise inseparably united with the advancement of all the sciences which in any way contribute to the study, diagnosis, treatment, and prevention of disease. The most important factors in the advancement of medicine are the education of our students, the greatest possible development of the individual in that particular work which he is best fitted to do, teamwork, and a constant cooperation with the related sciences.

Medical education must begin with the child. The child must learn to observe closely, think clearly, and describe what he has seen accurately. Medicine is but a branch of biology, and the methods em-

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ployed in the study of its other branches are similar to those used in the study of medicine. In all, close observation, clear thinking, and accurate descriptions are necessary. Hobbies in the study of the various branches of natural history furnish a child with the incentive for out-door recreation and the clinical study of life in the fields, woods and streams. They also create a desire to learn more about these subjects from the study of specimens which he has collected, and also from the available literature. The hobby furnishes a *reason* for the study of natural history in schools and for the study of English and drawing to give expression to the knowledge gained.

Hobbies in natural history and the study of natural history, English, and drawing, in our primary schools, are the very foundations of medicine in the education of the future physician. A broad interest in one branch of biology naturally leads to an interest in its other branches, including medicine. The more children become interested in biology, the greater the number who will study medicine later with a better training and also a keener appreciation of the importance of the clinical and laboratory branches, and the inseparability of both.

The pursuit of biology, English and drawing, should be continued throughout the entire education of individuals who are interested in natural history and biology. The branches of biology are many and the field in each branch is large and in some form it should never be omitted from the school and college curriculum. Its continued study makes for better citizens, better presidents, and more and better physicians.

The basic sciences, anatomy, physiology, chemistry, and pathology, and their close correlation with clinical medicine, that the student may realize the importance of each and the inseparability of all, are the very foundations of comprehensive education in our medical schools. Of these basic sciences pathology is the most important, as it furnishes a definite understanding for the clinical study of disease, namely living pathology; and the two are inseparable.

Hobbies bring out the best efforts of the individual. The ability to use the English language and either to illustrate or to appreciate the methods of illustration provides the best expression of these efforts. Hobbies and these methods of expression are the foundations for the greatest contributions of the individual in the advancement of medicine.

Medicine, including all of its specialties, can never reach a higher plane of excellence than that of the elements forming its foundations.

180 Washington Avenue.

RADIOGRAPHY OF CLOSED FALLOPIAN TUBES*

To Determine the Location of Obstructions

By William T. Kennedy, M.A., M.B. (Tor.), New York City

THE radiographic study of the uterus and tubes following their extirpation, presented by Sampson,[1] has given us an extremely concrete picture of the blood supply of these organs, and has shown us the danger of intrauterine applications with or without pressure when there is any break in the continuity of the uterine mucosa. Peterson,[2] clearly visualizing the uterus, tubes, and tumors of the pelvis and the abdomen by pneumoperitoneum and radiography, has introduced a classical method of diagnosing pelvic abnormalities. The insufflation of uterus and tubes with carbon dioxide, as done by Rubin,[3] in a small, but quite a laudable number of women who have been sterile because of some tubal obstruction, has rendered them able to become pregnant almost immediately and in practically every case has enabled the surgeon to determine the patency or nonpatency of the tubes. Before the introduction of Rubin's method it was clinically impossible to definitely confirm a diagnosis of occluded tubes and up to the present time the location of a preoperative obstruction has remained entirely to the surgeon when the patient's abdomen was opened, and even he with both tubes before him, has found it difficult to satisfy himself as to the condition of their canals. During an operation little time may be required or much time consumed endeavoring to locate the obstruction. In the end the real occlusion could easily have been overlooked, which difficulty might well account for the more or less discouraging results of salpingostomy performed even by skilled gynecologists. Further, Rubin's method has not lessened the surgeon's task of locating the site of the obstructions in or about the tubes until the patient is on the operating table. This task I shall endeavor to eliminate by presenting a somewhat clear diagnosis of the sites of obstruction before operation. I have been filling the uterus and tubes with a 20 per cent solution of sodium bromide and have been radiographing that part of the genital tract which has received the fluid. The pressure in and the quantity which has passed into the cavity have been noted. The ampulla of the tube

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*Read by invitation at a meeting of the New York Obstetrical Society, Jan. 9, 1923.

Note:—Following the reading of this paper it was learned that an article entitled "X-ray Diagnosis and Gynecology with the aid of Intrauterine Collargol Injection." (*Surgery, Gynecology and Obstetrics*, April, 1915, p. 435) by Dr. I. C. Rubin, had been overlooked. Credit which should have appeared in the body of this paper is hereby acknowledged.

rendering a shadow must be connected with the uterus by a patent isthmus even though the passage between contains no sodium bromide. If the ampulla of the tube does not appear on the radiograph an obstruction must exist either in the isthmus of the tube or in the cornu of the uterus, or the tube has been previously removed.

APPARATUS

The apparatus used to pass sodium bromide solution into the uterus and tubes and to measure the quantity and pressure of the fluid is shown in the following diagram (Fig. 1).

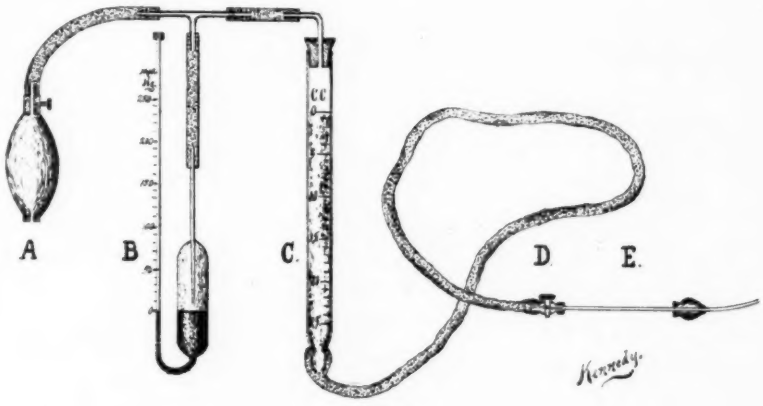

Fig. 1.

A—Compression bulb with release screw which is used to inflate the sleeve band of a sphygmomanometer.
B—Mercury Manometer used with the sphygmomanometer.
C—25 c.c. Burette to measure the Sodium Bromide solution.
D—Tap to control the passage of the solution.
E—Uterine hollow sound with rubber washer (Rubin).

PROCEDURE

The rubber connecting tubes, the sound E, the burette C, the sodium bromide solution, a bivalve vaginal speculum and a double tenaculum are sterilized by boiling.

The apparatus is connected as in Fig. 1 with the sodium bromide solution filling it from zero on the burette to the uterine end of the sound and the tap D is closed until used.

The patient is placed upon a cystoscopic x-ray table for radiographing the pelvis, ureters and kidneys. The Potter-Bucky diaphragm is used. A lead screen is used to protect the surgeon while the radiograph is made. Fig. 2 illustrates this arrangement.

Fig. 3 illustrates the lateral views and the corresponding vertical views of the different angles which the Rubin sound makes with the cavity of the uterus. When one knows the clinical position of the body of the uterus the degree of flexion can be estimated.

The first of a series of 20 patients was radiographed June 14, 1922. Two cases have been omitted because the radiographs were too faint to permit interpretation.

Of 18 cases herein described one had partially occluded and 17 had occluded tubes as demonstrated by insufflation with CO_2 according to the Rubin method before being radiographed. All patients were seen either one or two weeks following their radiographs, and the patient with partially occluded tubes was seen on two successive weeks. None of these patients gave a history of pelvic symptoms following examination.

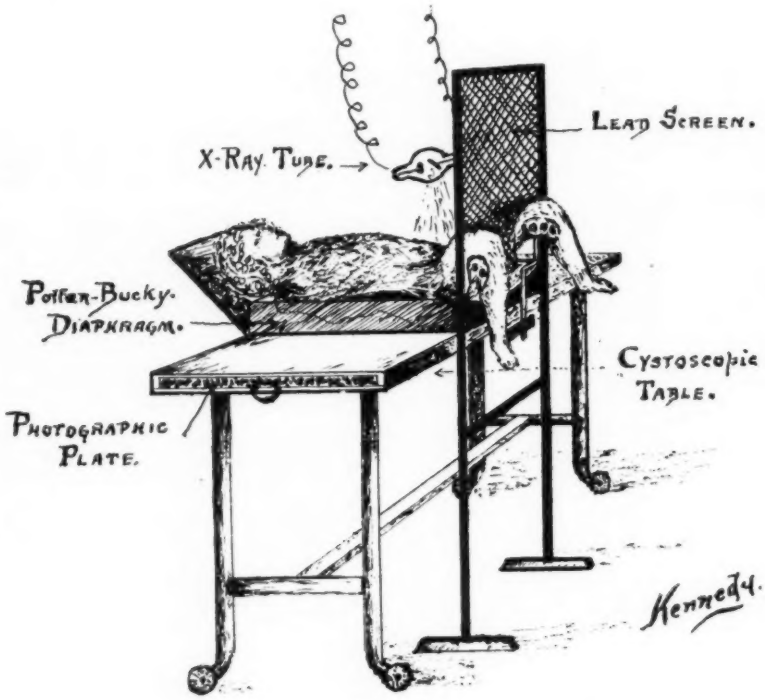

Fig. 2.

The uterus and tubes in the patient with partially occluded tubes (Case 1) cast no shadow. In Case 5 the uterus and tubes cast a shadow at the first examination (radiograph 10), but three weeks later no shadow was obtained with three trials. In Cases 6 and 7 no shadows were obtained. Therefore no sodium bromide passed beyond the internal os. All three cases had anteflexed, retrocessed uteri.

In 15 cases (omitting Cases 1, 6 and 7), of which radiographs are here shown, 4 tubes are known to have been removed at operation, leaving 26 tubes to be considered. Of these 26, 8 do not appear in the radiograph because they are closed at the cornu of the uterus or in the isthmus, and the remaining 18 tubes are closed at or about the

fimbriae. The occlusions are respectively 30.8 per cent in the isthmus and 69.2 per cent in or about the fimbriae. Of the 18 tubes casting shadows, 11 isthmi cast a shadow but 7 cast no shadow, that is, 18 isthmi allow the passage of sodium bromide solution and 11 or 61.2 per cent cannot contract enough to empty their contents, while 7 or 38.8 per cent can empty their contents in either direction. These

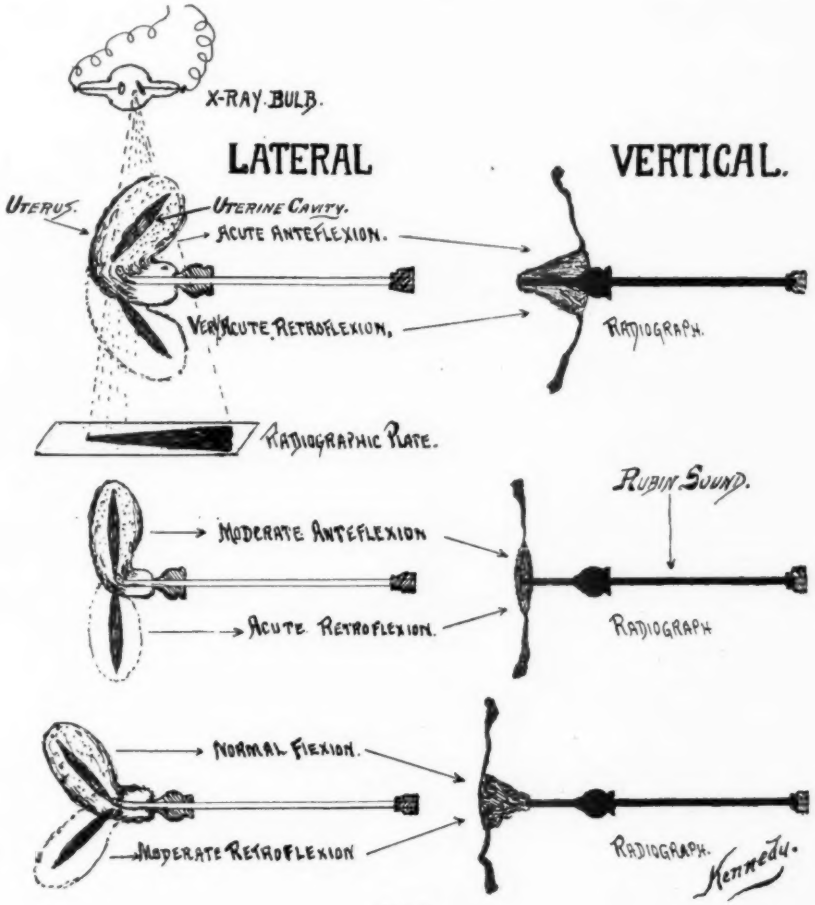

Fig. 3.

percentages are based upon a very small number of cases and may require changing when a larger series has been examined.

Cases 1 to 12 were married for periods varying from one to ten years and have never been pregnant. Cases 13 and 14 each has had an ectopic pregnancy only. Cases 15 to 18 each has had one or more intrauterine pregnancies.

Five cases have been operated upon, one by Dr. Ward, one by Dr. Rawls and three by myself.

Each radiograph has a key in its corner showing the sodium bromide shadows.

CASE REPORTS

CASE 1.—J. M., 26939.—Insufflation with CO_2—rate sufficient to raise the pressure 100 mm. in 20 seconds; first trial maximum pressure 200 mm.; no gas passed through the tubes. Second trial, maximum pressure 180 mm. when the gas began to flow through the tubes and continued at a pressure of 55 mm.; shoulder pains present. Diagnosis: partially occluded; age twenty-four years; married 1½ years; never pregnant. Numerous nonmotile spermatozoa present (unsatisfactory specimen). Uterus first degree retroverted, slight thickening in both adnexae.

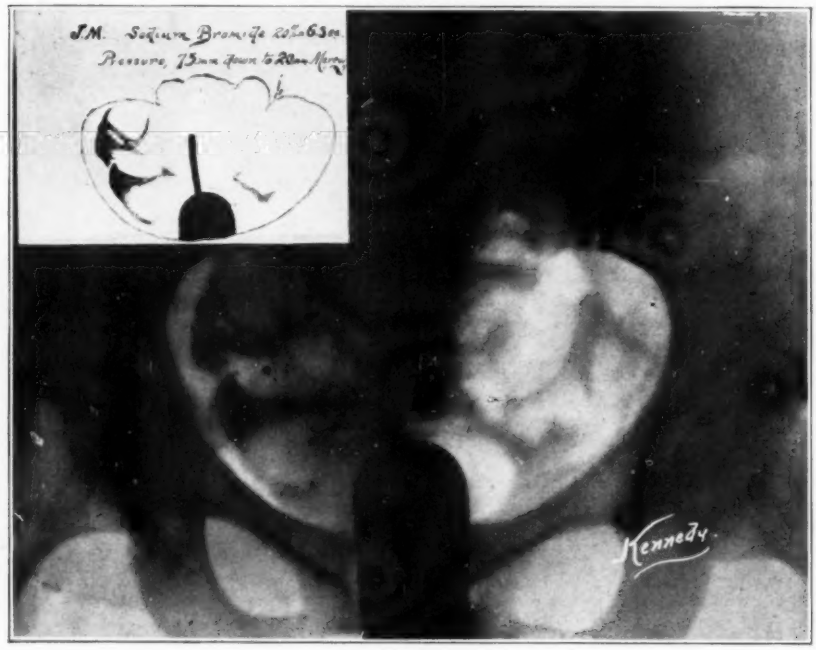

Fig. 4.

Radiogram (Fig. 4).— The body of the uterus and the position of the tubes cannot be seen as the musculature of these organs has forced all the sodium bromide solution into the right side of the culdesac.

Diagnosis.—No information except that at least one tube is patent and from the shadows one would expect the right.

Dysmenorrhea which frequently is associated with an anteflexed retroccessed uterus, having a stenosed cervix, would easily be caused by the irritation of the menstrual blood extruded through the tubes into the peritoneal cavity. Further, when any obstruction of the cervix occurs at menstruation, the uterus and tubes can force the menstrual blood and epithelium into the peritoneal cavity, thus easily explaining what Sampson[4] considers a very important factor in the etiology of ovarian hematoma. When the isthmi are open and the fimbriae occluded the menstrual blood would distend the ampullae and cause pain. In acute endocervicitis, occurring about the internal os, when the discharge is rather profuse (gonorrheal) any purulent material escaping into the uterine cavity could easily be forced into the peritoneal cavity, ow-

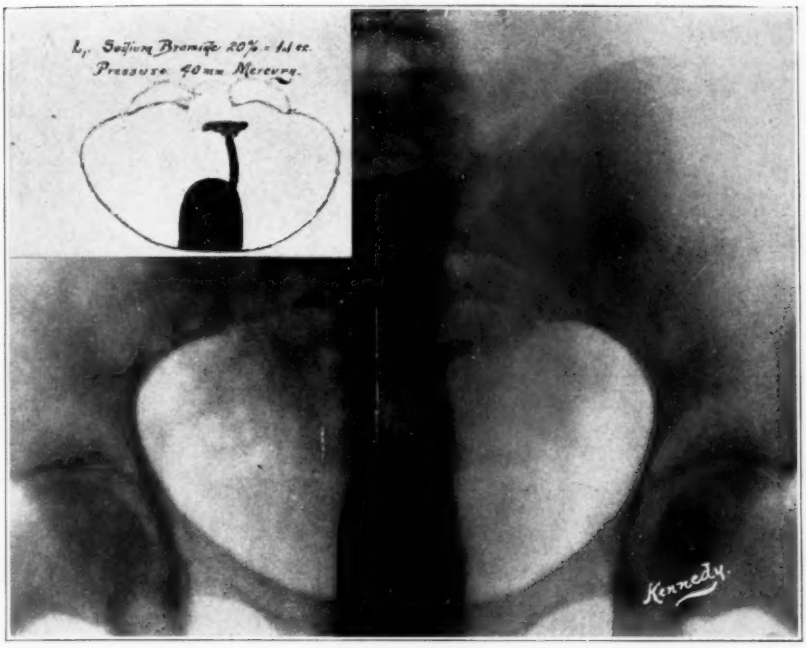
L. Sodium Bromide 20% = 1.1 cc.
Pressure 40 mm Mercury.
Kennedy.

Fig. 5.

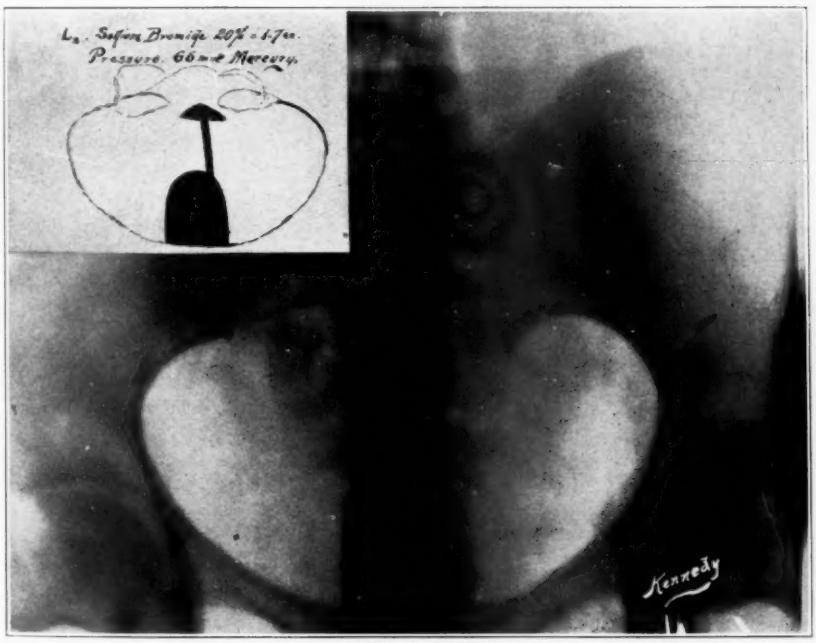
L. Sodium Bromide 20% = 1.7 cc.
Pressure 66 mm Mercury.
Kennedy

Fig. 6.

ing to the inflammatory obstruction of the internal os. This would easily explain the present conjecture that the gonococci enter the peritoneal cavity by passing over the mucosa and not by way of the lymphatics.

CASE 2.—L., No. 26637, occluded, age twenty-two years, married two and one-half years, never pregnant. Spermatozoa present; nonmotile (unsatisfactory specimen). Uterus infantile; adnexa negative.

Radiograms.—Figs. 5, 6, and 7 show the uterine cavity small and the axis of the body of the uterus about at right angles to the cervical canal. When the pressures were 40 mm. and 66 mm. of mercury, no solution appeared in either tube, but when the pressure was raised to 200 mm. of mercury, the left tube became filled with the solution but the right received none.

Diagnosis.—The uterine cavity is very small. Occlusions occur in the isthmus of the right tube and at or in the fimbria of the left. Left hydrosalpinx, small.

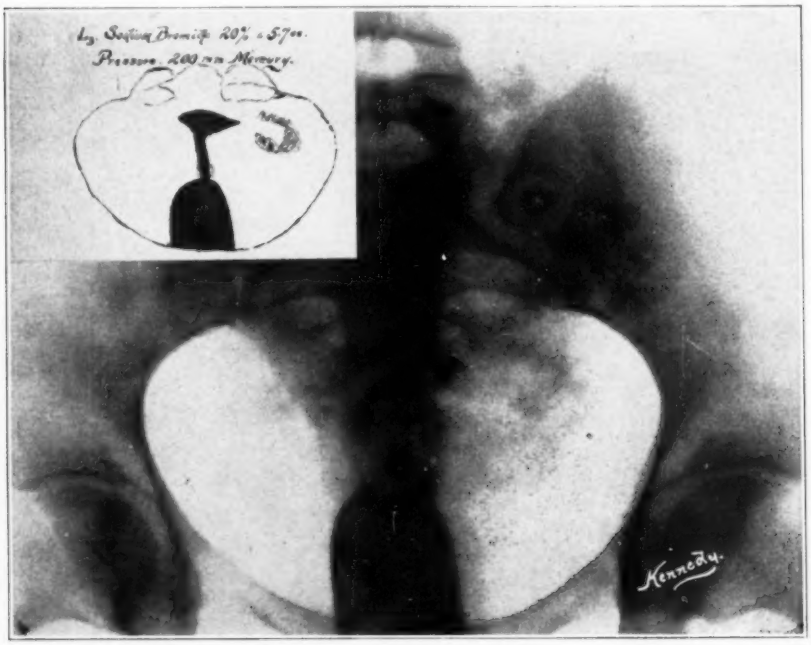

Fig. 7.

CASE 3.—S., No. 26716, occluded, age twenty-eight years; married ten years, never pregnant. Spermatozoa not examined. Uterus small, retrocessed, adnexa negative.

Figs. 8, 9, 10, and 11.—Uterine cavity 4 cm. by 3.5 cm. (medium size)—tubes apparently hang low on the broad ligaments and parallel with the axis of the uterus; hence are prolapsed. Each tube is open at its isthmus. The right tube has a long slender canal and may also have an accessory canal. The left tube is very probably a hydrosalpinx.

Diagnosis.—Left hydrosalpinx. Occlusions occur in both fimbriae.

CASE 4.—F. W., No. 25524, occluded age thirty-five years, married four years, had a dilatation and curettage two years ago—never pregnant. Spermatozoa numerous, nonmotile. (Specimen unsatisfactory.)

Radiogram.—(Fig. 12) Uterus small, no shadow of left tube—low shadow of the right fimbria.

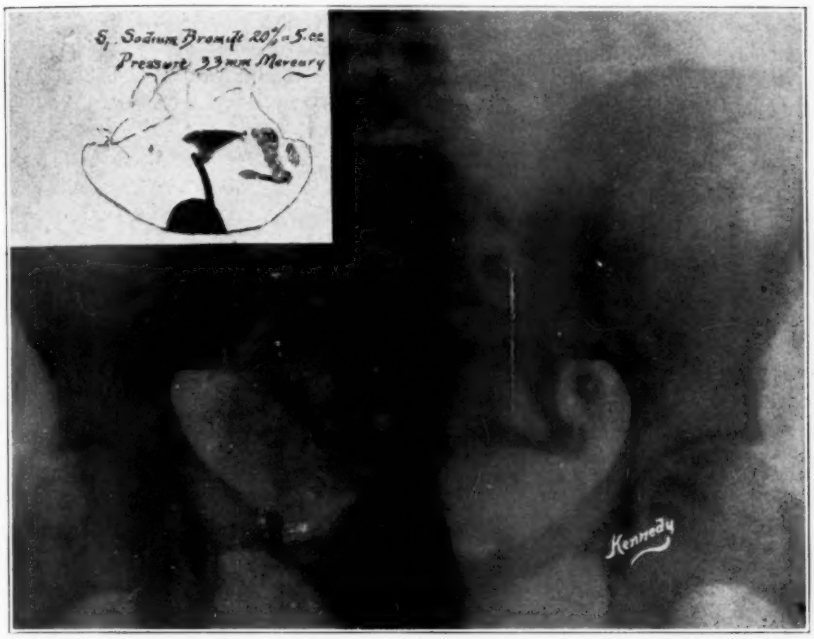
S1. Sodium Bromide 20% a 5. cc
Pressure 33 mm Mercury
Kennedy

Fig. 8.

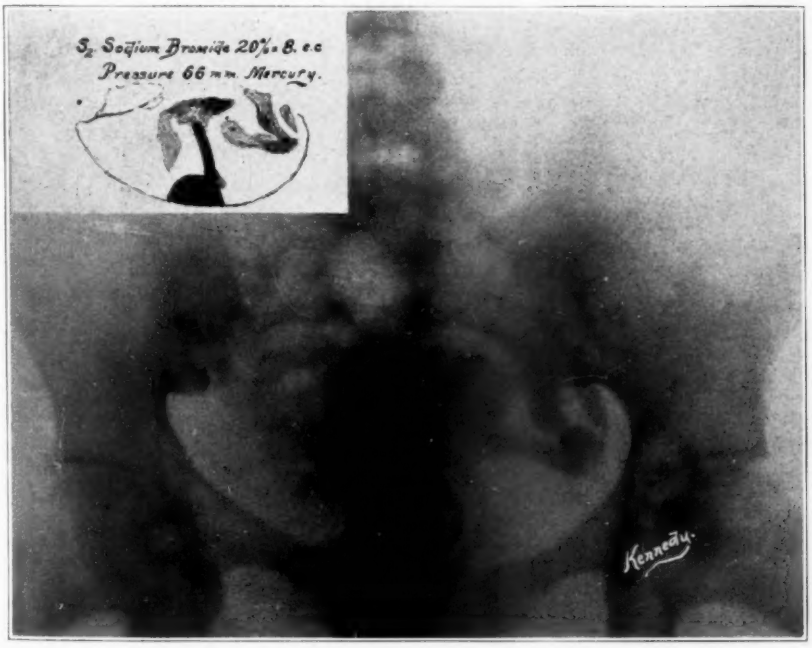
S2. Sodium Bromide 20% a 8. c.c
Pressure 66 mm. Mercury.
Kennedy.

Fig. 9.

Diagnosis.—Uterus infantile, left isthmus occluded, right tube prolapsed, right fimbria occluded.

CASE 5.—C. W., No. 26966, occluded, age twenty-seven years, married five years, husband had two children by his first wife; patient was told she had salpingitis eight years ago. Has had a vaginal discharge for two years. Uterus small, anteflexed, retrocessed adnexae negative.

Radiogram.—(Fig. 13.) Uterus small, the axis of the body of the uterus makes an acute angle with the canal of the cervix. No right tube visible. A blurred ampulla of the left tube appears with a small canal leading to the uterine cavity.

Radiogram.—Three weeks later, no shadow.

Diagnosis.—Anteflexion of the uterus; right isthmus occluded, left fimbria occluded.

Operative Diagnosis.—8/8/22. The right tube was closed at its fimbria, the fimbria being turned down and attached to the posterior wall of the broad ligament by a

Fig. 10.

small adhesion. The right isthmus, for a length of about 2 cm., was extremely small and had a core-like canal about 1½ mm. in diameter. The left tube was closed at the fimbria, this fimbria being spread out over an ovarian cyst about 4 cm. in diameter and attached by an adhesion to the posterior wall of the broad ligament. There were a few filmy adhesions from the cervix to the posterior wall of the culdesac but these were not drawing the uterus backward. The uterus was normal in position and the anteflexion was not noted at the operation. It is probable that the uterine musculature may have relaxed under anesthesia allowing the anteflexion to disappear.

CASE 6.—A. G., No. 31197, occluded, age twenty-four years, married four years, never pregnant. Husband not examined. Her complaint was not sterility but painful menstruation for four years. Uterus anteflexed and retrocessed. At operation 10/16/-22 it was found that the axis of the cervix was inclined about 75 degrees to the axis of the uterus.

Radiogram.—No shadow.

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Fig. 11.

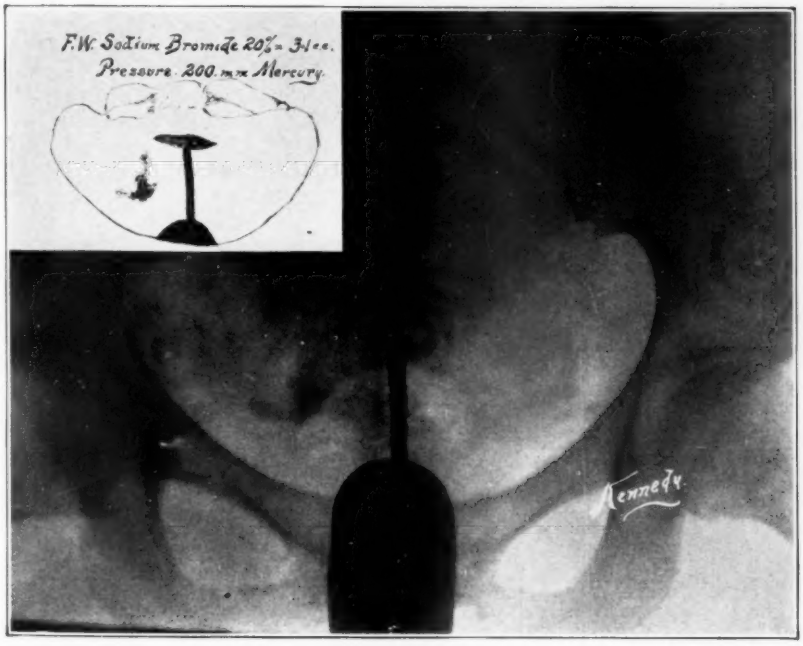

Fig. 12.

CASE 7.—E. T., No. 22637, occluded, age twenty-nine years, married five years, never pregnant. Complaint, sterility. Uterus anteflexed and retrocessed. Operation three years ago; dilatation and curettage with stem pessary inserted.

Radiogram.—No shadow.

CASE 8.—T. N., No. 26969, occluded, age twenty-six years, married six years, spermatozoa not examined. Uterus underdeveloped. Adnexa thickened, left ovary cystic.

Radiogram.—(Fig. 14) Uterus medium size with axis of body at right angles to the axis of the cervix. No shadow of the right tube, shadow for ampulla of the left tube. There is a very long slender canal from the left cornu of the uterus to the fimbria of the tube.

Diagnosis.—Right isthmus occluded; left fimbria occluded. "Clubbed fimbria" of the left tube. Constricted canal of the left tube.

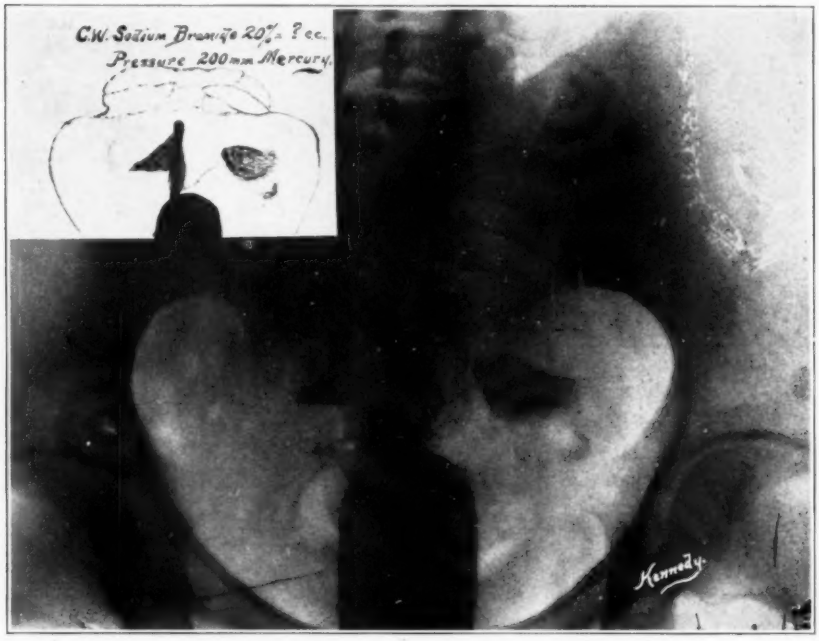

Fig. 13.

CASE 9.—J. R., No. 27521, occluded, age twenty-seven years, married one year, never pregnant. Adherent retroverted uterus, thickened adnexa.

Radiogram.—(Fig. 15.) Uterus retroverted, each ampulla casts a shadow.

Diagnosis.— Retroverted uterus; prolapsed right tube, occlusions occur at both fimbria.

CASE 10.—R. P., Private, occluded, married eight years, never pregnant.

Radiogram.—(Fig. 16.) Uterus small, no tubal shadows.

Diagnosis.—Each tube occluded at its isthmus.

CASE 11.—I. C., No. 27532, occluded, age twenty-five years, married four years, never pregnant. Cervix stenosed. Uterus small and forward. Right appendage negative. Left appendage tender. Left chronic salpingitis with pelvic adhesions. Semen test, three examinations, no spermatozoa found. Prostatic crystals present.

Radiogram.—(Fig. 17.) Uterus medium sized, shadow of uterus at right angles to

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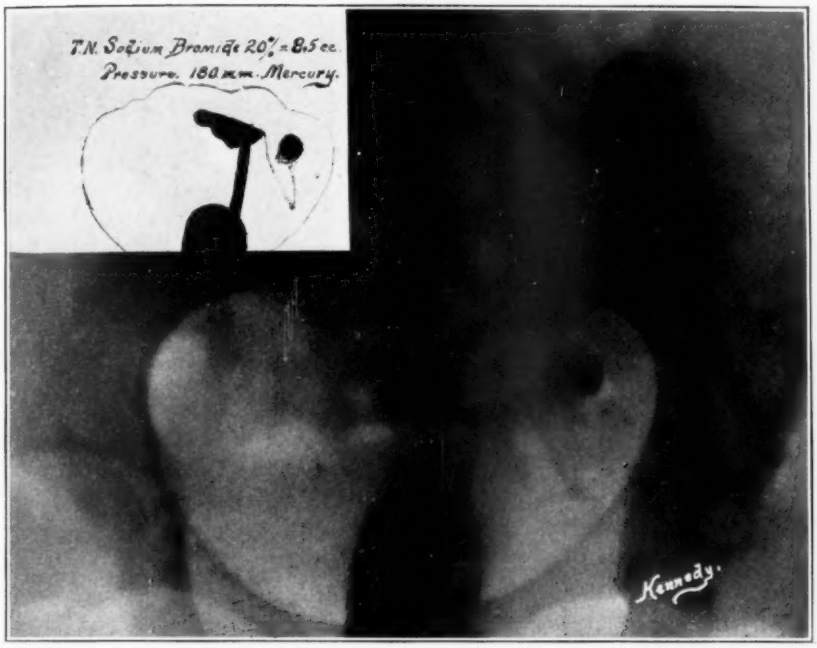

Fig. 14.

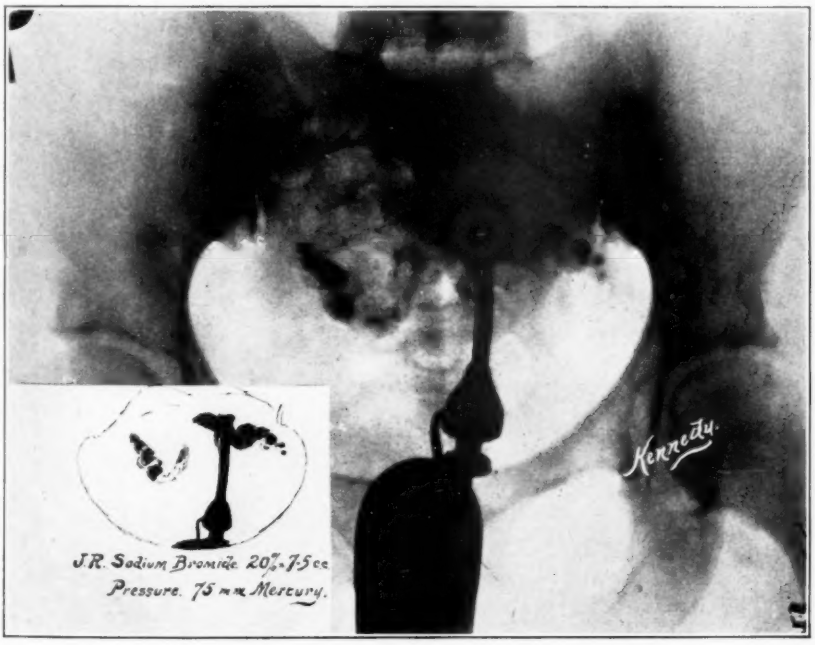

Fig. 15.

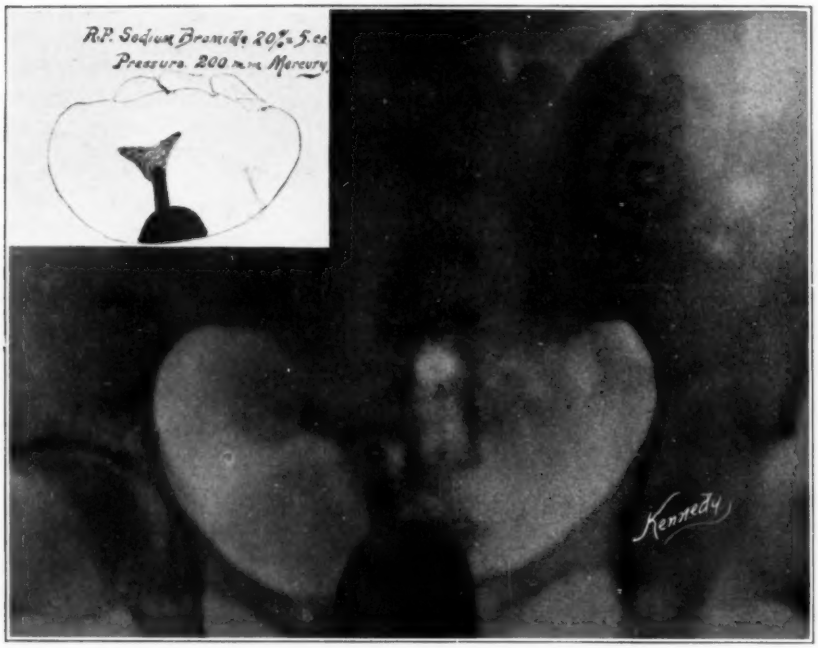
R.P. Sodium Bromide 20% 5 cc
Pressure 200 m.m. Mercury
Kennedy

Fig. 16.

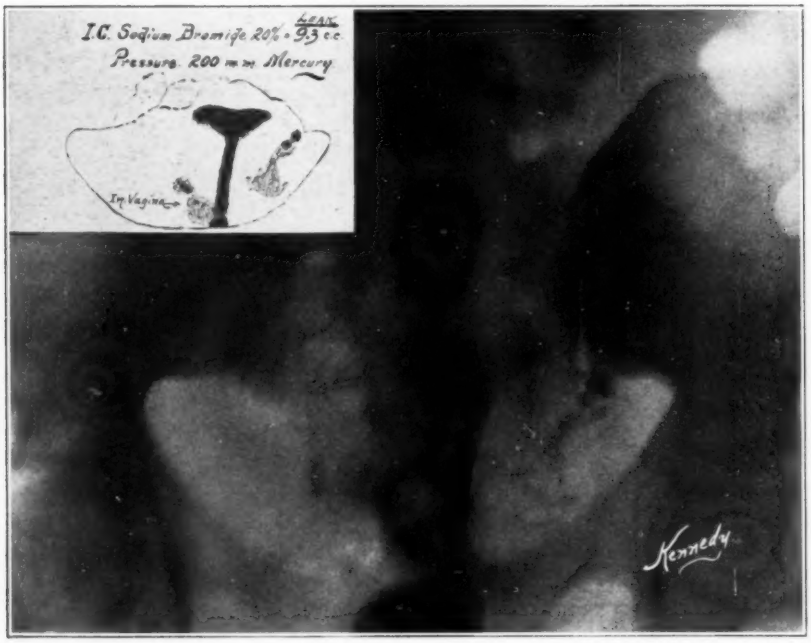
I.C. Sodium Bromide 20% 9.3 cc
Pressure 200 m.m. Mercury
In Vagina
Kennedy

Fig. 17.

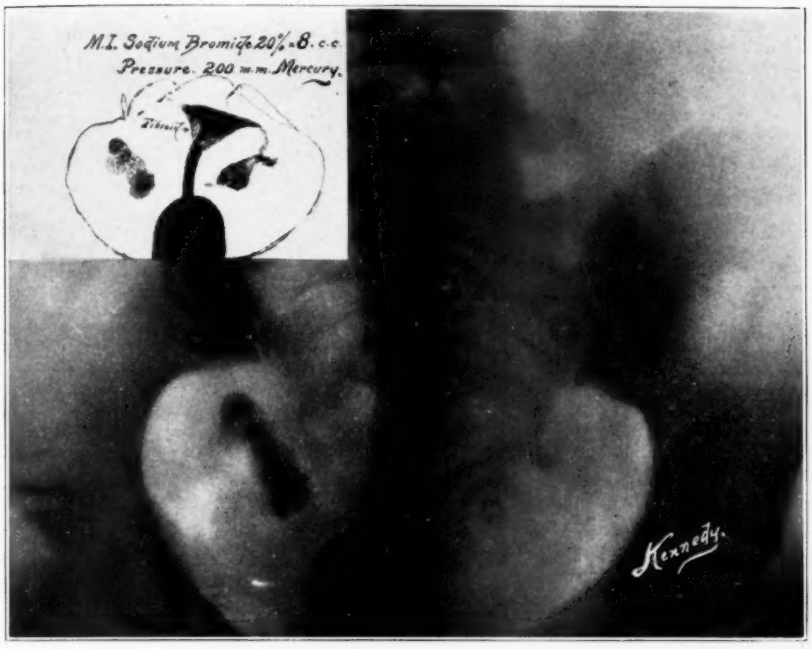
M.I. Sodium Bromide 20% - 8. c.c.
Pressure. 200 m.m. Mercury.
Kennedy.

Fig. 18.

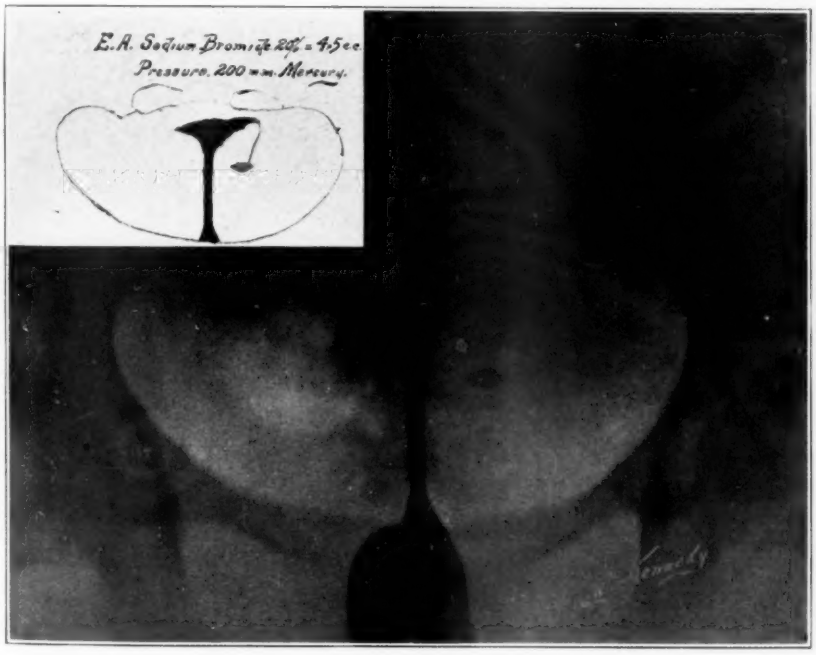
E.A. Sodium Bromide 20% - 4.5 cc.
Pressure. 200 m.m. Mercury.

Fig. 19.

the cervix. No ampulla of the right tube visible. Left ampulla and fimbria parallel with the uterus, hence prolapsed, with fimbria in the culdesac near the pelvic wall. Sodium bromide in vagina.

Diagnosis.—Moderately anteflexed uterus, right isthmus occluded, left isthmus patent. Left tube prolapsed in culdesac. Fimbria spread out, occluded and adherent.

CASE 12.—M. I., No. 31428, occluded, age thirty-one years, married 10 years, never pregnant. Complaint sterility and pain in lower abdomen for ten years. D. and C. ten years ago. Semen, normal number of spermatozoa with slight motility. Bilateral chronic salpingitis; fibroma uteri; anteflexed uterus.

Radiogram.—(Fig. 18) Uterus moderately anteflexed, both tubes parallel to the uterus, right ampulla showing but right isthmus distinctly absent. Left ampulla and

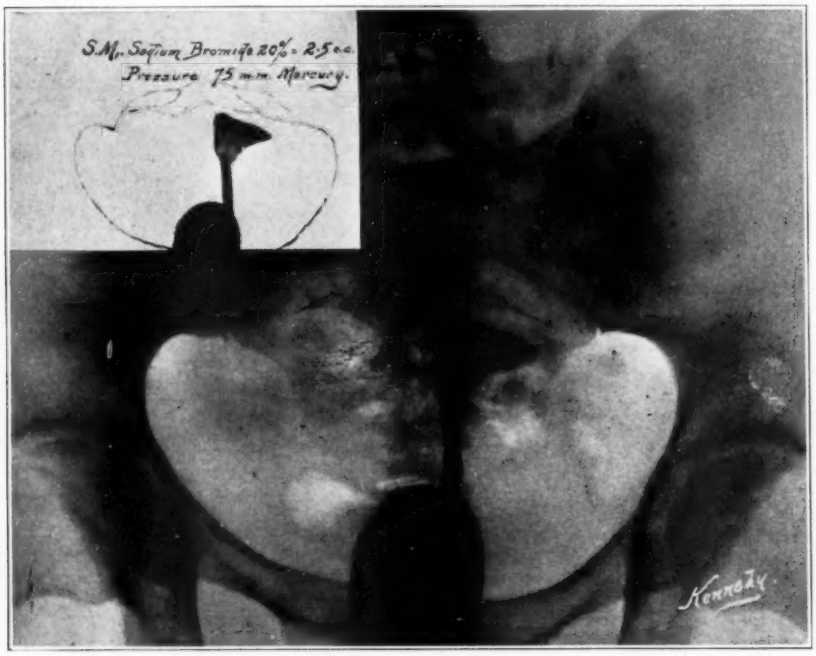

Fig. 20.

left isthmus both showing. Right tube larger than left and nearer its respective pelvic wall. Depression on inner uterine wall about one third of the way from the internal os to the right cornu.

Diagnosis.—Moderate anteflexion of the uterus. Right tube prolapsed, closed at fimbria and clubbed. Not a hydrosalpinx. Left tube closed at fimbria and more adherent in the culdesac, not a hydrosalpinx.

Operative Findings.—Nov. 23, 1922. Dr. Rawls. Both tubes were dilated for their outer seven eighths and were buried by adhesions with the ovaries in the culdesac, which adhesions also closed their fimbriated ends. Both ovaries were normal. Just above the internal os on the anterior right surface of the uterus, was a small fibroid, and a similar one on the left posterior surface of the uterus near the horn. There was no stenosis of the cervix although it was rather short in length with the uterus anteflexed upon it.

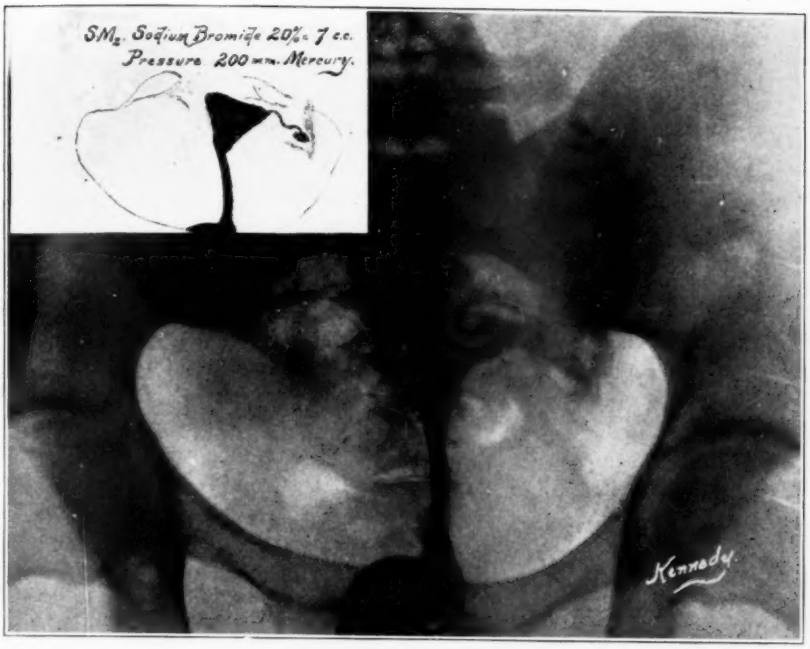
SM. Sodium Bromide 20% 7 c.c.
Pressure 200 mm. Mercury.
Kennedy.

Fig. 21.

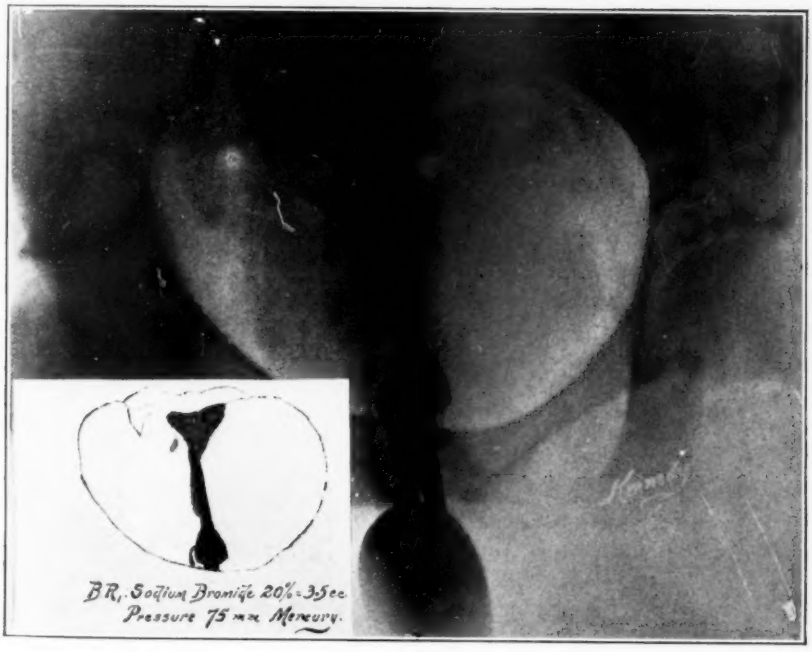
BR. Sodium Bromide 20% 3.5 cc.
Pressure 75 mm. Mercury.

Fig. 22.

CASE 13.—Private, occluded, age thirty-eight years, married seventeen years. Had an ectopic pregnancy in the right tube thirteen years ago. Tube removed by operation, uterus retroverted, adnexa negative.

Radiogram.—(Fig. 19.) Uterus small, retroverted, no shadow of the right tube, left tube very small with a closed fimbria.

Diagnosis.—Retroverted uterus, right isthmus closed (tube resected). Left tube probably rudimentary in character with a clubbed closed fimbria (small hydrosalpinx).

CASE 14.—S. M., No. 27109, occluded, age thirty-four years, married two years. Right ectopic pregnancy one and one-half years ago. Tube removed by operation. Pelvis negative.

Radiograms.—(Figs. 20 and 21.) Uterine cavity apparently in the same straight

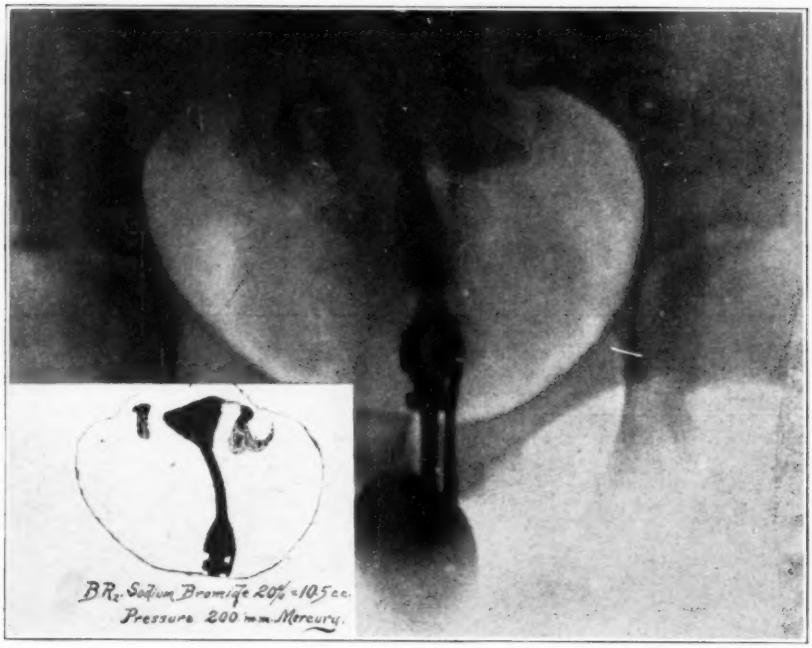

Fig. 23.

line as the cervical canal. Medium sized cavity, no shadow of the right tube. Shadows show a rudimentary left tube with its fimbria closed.

Diagnosis.—Right tube absent, left tube rudimentary and closed at its fimbria.

CASE 15.—B. R., No. 308-49, occluded, age thirty-three years, married five years; one pregnancy three years after marriage which ended in a spontaneous abortion at four months. Was a widow one year. Re-married and has been living with second husband for five years. No further pregnancy. No spermatozoa examination as husband did not so desire. Uterus indefinite. Both adnexa thickened.

Radiograms.—(Figs. 22 and 23.) Uterus normal position, medium size. There are shadows of the ampullae of both tubes. Tubes are parallel with the axis of the body of the uterus, hence they are on the posterior wall of the broad ligament, prolapsed and clubbed, neither is a hydrosalpinx.

Diagnosis.—Both tubes prolapsed and both fimbria closed.

Operative Diagnosis.—Aug. 4, 1922. Uterus was forward in position and normal

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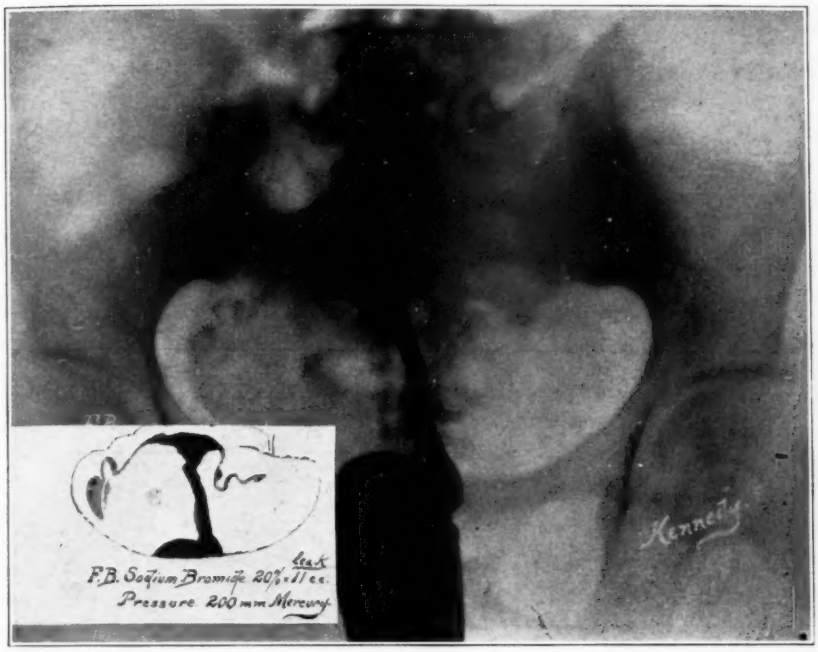

Fig. 24.

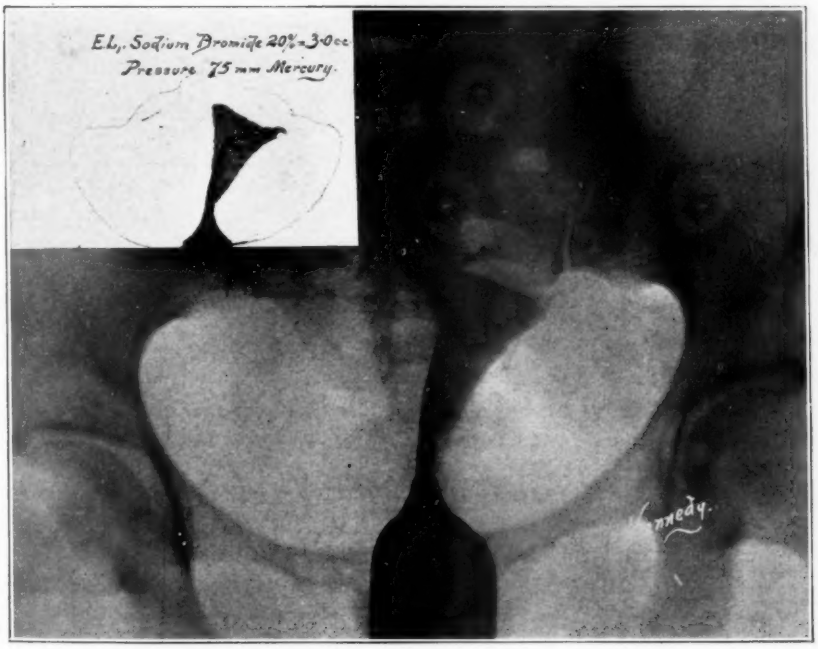

Fig. 25.

in size. Each tube was club-shaped, occluded at its fimbria and fastened to the posterior wall of the broad ligament near its pelvic extremity by rather firm adhesions. The peritoneum immediately posterior to the uterus was entirely free from adhesions. Both ovaries were normal.

CASE 16.—F. B., No. 266669, occluded, age thirty-six years, married ten years. Dilatation and curettage eight years ago. One spontaneous abortion seven years ago. One full term pregnancy six years ago. Uterus retroverted and retrocessed. Right ovary prolapsed and tender. Left adnexa thickened.

Radiogram.—(Fig. 24.) Uterus appears retroverted, right tube casts a shadow reaching out to the pelvic wall. Left tube shows a shadow near the uterus parallel with the uterine axis in its proximal portion, then turns laterally towards the pelvic wall.

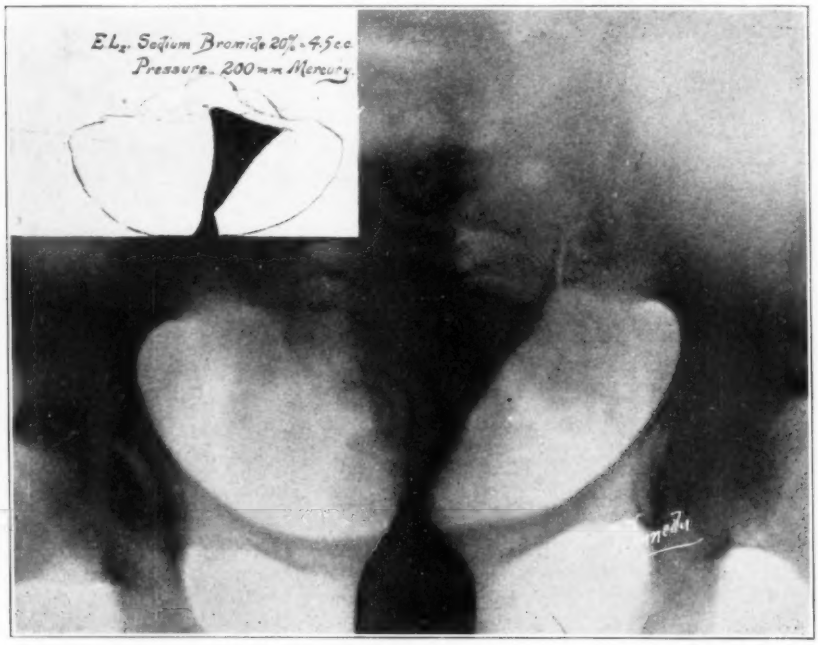

Fig. 26.

Diagnosis.—Tubal canal small, each tube occluded at its fimbria, left tube prolapsed.

CASE 17, E. L. No. 27524, occluded, age thirty-two years, married twelve years, two children eleven and ten years of age. Abdominal operation eight years ago. Cervix amputated but still slightly eroded and hypertrophied. Uterus enlarged.

Radiograms.—(Figs. 25 and 26.) Uterus normal in position, large, no shadow of either tube appears.

Diagnosis.—Bilateral salpingectomy has been done.

CASE 18.—C. D., No. 31479. Age twenty-nine years, married thirteen years; became pregnant one month after marriage but lost this pregnancy at seven months and has never been pregnant since. Husband died. Patient was widow then for one year and has been married again for two years.

Radiogram.—(Fig. 27.) Uterus moderately large and in position, no shadow of

right tube visible; shadow of isthmus and ampulla of the left tube with distal portion of the shadow faint, because the sodium bromide solution was diluted.

Diagnosis.—Uterus normal in position, cavity large, right isthmus occluded, left tube has a small hydrosalpinx at its distal end and is occluded at the fimbria. This tube is prolapsed and lies toward the pelvic wall.

Operative Findings.—Nov. 28, 1922. Dr. Ward. Both adnexa were buried in adhesions. Left tube converted into a small hydrosalpinx, containing clear serum-like fluid, was behind the uterus. Right tube had a small nodosum at the uterine horn, was chronically diseased and closed.

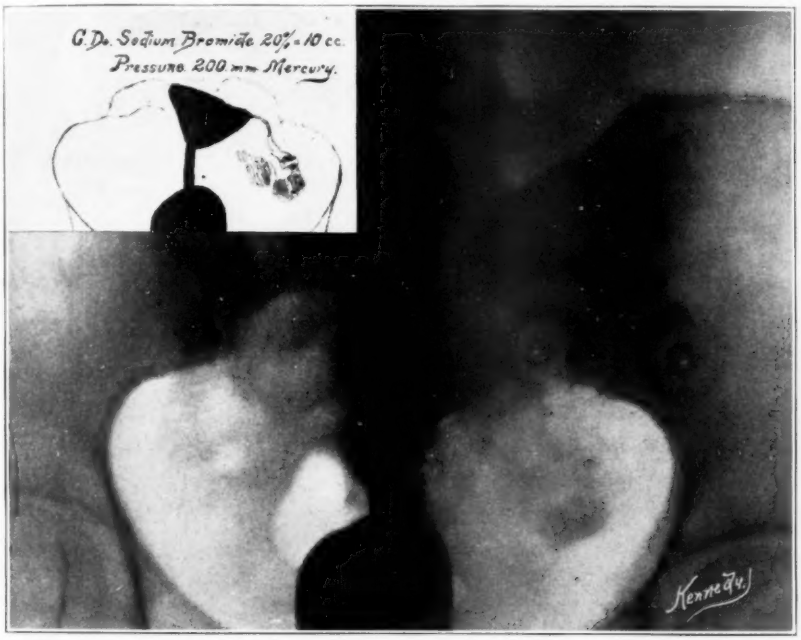

Fig. 27.

CONCLUSIONS

1. In view of Sampson's work no radiogram should be made in any case where there is evidence of bleeding.

2. The degree of flexion of the body of the uterus can be determined if one knows the position of the uterus.

3. The internal os can withstand a pressure of 200 mm. of mercury in the cervical canal without its musculature allowing the passage of any solution into the uterine cavity.

4. That many isthmi, while permitting the sodium bromide solution to pass through their canals can overcome a pressure of 200 mm. of mercury and expel their contents in either direction.

5. That 30.8 per cent of the tubes examined were occluded at the isthmus and 69.2 per cent were occluded at the fimbria. Of the

tubes casting a shadow 61.2 per cent of the isthmi appear and 38.3 per cent do not appear.

6. That a radiogram obtained according to the above method, when one tube is, or both tubes are, patent or partially occluded is,

   a. That probably only one tube is open, in which case practically all the sodium bromide would be seen in that side of the pelvis.

   b. That when the cervix is tightly closed the uterus and tube (or tubes) completely empty their fluid contents into the peritoneal cavity.

7. That the surgeon is able to determine the following points before opening the abdomen:

   a. The length, breadth, position and direction of the canal of any tube casting a shadow.

   b. The exact site of the occlusion, whether at the fimbria or in the isthmus.

   c. Whether a tube, open at its isthmus and closed at its fimbria is empty and simply clubbed, or is filled with fluid, such as hydro- or hematosalpinx.

   d. Whether an operation to overcome the obstruction and thus remove the sterility might hopefully be done when at least one isthmus is open, or might be almost useless when both isthmi are closed.

8. That a study of the sterile woman having no active cervical or tubal involvement should be initiated with carbon-dioxide insufflation (Rubin). If an occlusion is determined, the uterus and tubes should be radiographed as herein described to determine the points of occlusion, and provided the husband is normal, a salpingostomy may be done with some hope of success, if the occlusion is at the fimbriated end of the tube.

I desire to express my gratitude to Dr. George Gray Ward, Chief Surgeon of the Woman's Hospital, for the privilege of undertaking this study and placing material at my disposal for its development, to Dr. A. H. Aldridge, Resident Obstetrician at the Woman's Hospital, for his hearty cooperation in insufflating these cases previous to their being radiographed, and to Mrs. C. A. McIntosh, technician, for her painstaking technic.

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(4) *Sampson:* Am. Jour. Obst. and Gynec., Nov., 1922, iv, p. 451.

(*For discussion, see p.* 113.)

DESICCATED OVARY; ITS USE, PREPARATION AND A SUGGESTION AS TO A METHOD OF STANDARDIZATION*

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DESPITE the extensive use of ovarian products in therapy healthy skepticism as to the presence in them of a genuine therapeutic principle still exists. That this should be so is not beyond what ought to be expected; and this for the following reasons: (1) our knowledge of ovarian function both alone and in concert with the integral physiologic activity of the female animal is still meagre; (2) ovarian dysfunction is still a nosologic enigma (excepting the menopause syndrome) and the opinion that this or that group of symptoms is the result of ovarian disturbance still carries weight primarily by virtue of being voiced ex-cathedra; (3) assuming the presence of a therapeutic principle or principles in the ovary virtually nothing is known of its chemistry and hence no certain definite measures can be taken in the preparation of the gland to avoid destruction of them; (4) in the preparation of the organ for therapy some products may be inert, others active and an indiscriminate use of them all leaves the sum total of clinical deductions zero.

The subject matter of this report cannot we believe be looked upon as a study in endocrinology. In substance, what was done was simply to administer to a group of women selected on the basis of a single symptomatic manifestation an organic powder derived from ovarian gland after submitting the gland to a very distinct and controlled series of physical conditions. We might suggest that we find ourselves in a position quite unlike the investigator in endocrinology. Such an investigator is thoroughly conversant with and faithfully attentive to every minutiae of clinical detail and differentiation, but his knowledge of the endocrine products he uses is usually limited to the information on the bottle containing his preparation. We are most concerned with the label on the bottle and have fashioned our study to meet that paramount concern. That portion of this report that appears as pertaining to endocrinologic theory and practice is offered as explanatory of the rationale of the study and investigation that gives this report its being.

*Read at a meeting of the New York Academy of Medicine, Section on Gynecology and Obstetrics February 27, 1923.

The ovaries serve a dual function. The prime gonadial function is that of germplasm perpetuator and transmitter. The menstrual cycle is a part of the physiologic mechanism related to germplasm transference. The ovaries contemplated as somatic organs have as their second function that of controlling the secondary sexual characteristics, so-called. This duality of function must be constantly borne in mind since it strikes at fundamental principles both in our attitude toward gynecological symptomatology and therapy. Medical opinion has never been that the individual to maintain health must either possess or exercise his or her prime gonadic function. It follows, therefore, that all gynecological symptoms referable to this function are not necessarily manifestations of disorders. We cannot, we take it, regard sterility and persistent amenorrhea not ensuing from local malformations, inflammatory or neoplastic diseases as evidence of disease in the individual. With the application of ovarian therapy to this phase of ovarian deficiency we are not at present concerned. The use of desiccated whole ovary for idiopathic amenorrhea and sterility has in our experience been productive of nothing but disappointments. To our knowledge there is no evidence extant that is at all acceptable pointing to an active therapeutic principle in the ovary—be it from the whole gland, corpus luteum or ovarian residue—a principle referable to this prime gonadic function.

The ovarian gland studied from the viewpoint of its secondary function promises much from the aspect of therapy. As regards this aspect of ovarian function—to which aspect all further observations and comments are confined—we can postulate syndromes of hyperfunction, deficiency (hypofunction) and dysfunction. We have no desire to discuss these syndromes in their many aspects but simply to point out that in a deficiency disease effective therapy can only be brought about by supplying the deficient chemical. Here the therapy is specific. When we speak of dysfunction we intimate the presence of an imbalance and we do not necessarily point to the character of the therapy. We might, therefore, hope to find in the ovary principles referable both to deficiency syndromes and imbalances. The former would necessarily be specifics and the latter quite likely non-specifics. We may if we wish refer to the deficiency principles as "effectors" and other principles as "regulators."

Where glandular extracts have demonstrable pharmacodynamic actions as have those of the pituitary and adrenal glands, for example, biologic tests for the presence of their action can be used to gauge the concentration of the pharmacodynamic principle in any glandular preparation. But a recourse is lacking for titrating glandular extracts devoid of known pharmacodynamic action. It must be strictly

borne in mind, however, that therapeutic principles need not necessarily have demonstrable pharmacodynamic action.

No constant dependable or serviceable pharmacodynamic principle has yet been extracted from the ovarian gland. Its therapeutic principle or principles, if existent, must still be demonstrated in purely clinical fashion. The data so obtainable do not lend themselves to anything beyond the simplest statistical tabulation. When dealing with phenomena that are subjective we abruptly encounter that group of critics who hypothesize circumstances that are in the domain of the psychiatrist. This is to say, if drug therapy is reputed to remove a symptom the question is immediately raised, if suggestion or some other purely psychic mechanism may not have been behind the effect. The advantage lies all with such critics for they cannot be categorically answered.

On the other hand there is the danger of over emphasizing the value of facts acquired by standards of laboratory exactness. Relative to the vast literature of endocrinology but two scientifically complete researches have resulted. We refer to the isolation and chemical identification of epinephrin with the establishment of which we associate the names of Takamine and Abel, and the work of Kendall in chemically identifying an active principle of the thyroid—thyroxin. No one we are sure will underestimate the value of these two splendid researches. We do fear, however, that the tendency exists to overrate the resulting status of our knowledge with respect to the physiology of the suprarenal and thyroid glands. While no one considers the sum total of suprarenal function the elaboration of epinephrin, the tendency is gaining ground of regarding the thyroid as simply a thyroxin producer. Especially since Plummer demonstrated that thyroxin is curative of the completely athyroidal state—myxedema. This indiscriminate substitution of a part for the whole on bases still no firmer than mere speculation is most certain to thwart progress.

We may with profit carry in mind the significance of these facts when systematically undertaking the study of the efficacy of ovarian therapy. Greatest promise lies in accepting established principles, in abiding by tried formulae and in starting from clinical certainties. The whole is greater than any of its parts and if a therapeutic principle exists in any part of the ovary one would find it in the use of the whole gland. At any rate, it appears to us that a demonstration of the absence of a therapeutic principle in the whole gland would be proof of the absence of it in any part of it. We ought, at least, to begin with the study of whole gland therapy as offering the greatest promise. The therapy, furthermore, ought first to be applied

to a clinical entity generally accepted as bound up with a disturbed ovarian function; naturally the menopause syndrome.

An analysis of the clinical syndrome associated with approaching menopause (and following artificial menopause as well) offers a group symptomatology that varies qualitatively and presents correlations of predominance truly different for each patient. One recognizes symptoms or signs that may be called psychic, those neurologic, those metabolic and those physiologic. Very naturally most of those signs and symptoms are attributes of many and varied disturbances elsewhere in the body consequent upon ovarian dysfunction. And while one truly enough makes a diagnostic judgment on the symptomatology as a coordinated whole it very often happens that the symptom most annoying to the patient—the one for which relief is chiefly sought is based on a cause quite removed from ovarian disturbance. The result under such circumstances is treatment upon a wrong diagnosis with failure to relieve and depreciation of the therapy for the alleged condition.

To cite an example: a patient presents a group of symptoms that is diagnosticated menopause syndrome among which is that of pruritus cutaneus. The patient is most concerned about the pruritus. Treatment is instituted calculated to overcome ovarian dysfunction with equivocal results and decidedly no relief from the pruritus. The true circumstances are these. The patient is entering the climacteric which accounts for most of her symptoms. She has, however, a distinct hyperglycemia (diabetes mellitus?) as well which has caused the pruritus. The annoying pruritus which persists keeps her in such a mental state that she has little patience with the less annoying symptoms and belittles the effects thereon of ovarian therapy. The clinician chalks a zero to the credit of ovarian therapy for that case of menopause syndrome. Such are the difficulties that beset those seeking to properly evaluate by clinical statistical studies endocrine therapy.

Dysfunction operates in a vicious circle. Causes induce effects which in turn are causes for new effects. The circle may be dissipated if severed at important links. And the crucial links are never the psychic—this with all due apologies to psychiatrists. The only hopeful attitude in medical science makes it axiomatic that mental states have physicochemical masters.

We have with the menopause syndrome a peculiar though quite pathognomonic vasomotor disturbance referred to by the patient as "flashes" or "hot and cold flushes." We call it pathognomonic because it is a symptom that is quite exclusively female and so frequently occurs in conjunction with the other complaints of the climac-

teric. It is a symptom that we may safely stand by as indicating ovarian disturbance.

In the cases selected by us for study no patient was accepted as suffering from ovarian dysfunction unless "flashes" were complained of. These patients were fed desiccated whole ovary of our own manufacture put up in capsules containing approximately four grains of desiccated material. The patients were required to take one capsule three times a day. This ovarian therapy succeeded in 100 per cent of cases (approximately 50 cases) in completely dissipating this annoying symptom within 30 days of the beginning of treatment, the time needed being proportional to the severity of the symptom inasmuch as a constant dosage was used in all cases. In many patients the symptom would return within a week after the withdrawal of the therapy and it appeared necessary to continue therapy over a long period of time to keep the symptom suppressed. In a vast majority of the patients the other motley group of symptoms disappeared together with the "flashes." The manner of the patients reporting the effects of ovarian therapy was something after this fashion: "flashes gone, felt stronger," "flashes gone, not so nervous," "flashes gone, feel fine," "flashes gone, feel all right." The symptom complex with ovarian dysfunction about the time of the climacteric for the average patient, at least, eludes detailed expression. Not altogether unlikely is the explanation that it is all the result of vasomotor unstability that leads to minor and profound disturbances and to vague discomforts plus the "flashes." Both cow and pig ovaries were used and no difference in efficiency of action could be detected.

A drug that relieves a symptom in 100 per cent of cases is a specific for that symptom. The ovary contains at least one active therapeutic principle. That principle functions to adjust an unstable vasomotor system. A whole ovarian product properly prepared should contain this principle and its activity may be judged by a therapeutic test. Can it relieve "flashes"?

One may assert that very often "flashes" disappear spontaneously. Very true. The menopause syndrome is a self-dissipating clinical entity. The organism usually though not always adjusts itself to this ovarian dysfunction. Its "regulator" activity is vicariously taken up elsewhere. But during the period of function transference the imbalance supervenes. The added ovarian principle enables a smoother, more gradual passage of the ovaries out of the organic symphony. In this fashion it serves its purpose in those cases where adjustment would come about spontaneously. For those cases ovarian therapy does not supply so much an essential loss as a glandular adjuvant filling a temporary want in a transitional period.

Some untoward symptoms arose as a result of therapy with some

of our patients. We interpreted them as signs of overdosage since they disappeared immediately when the dosage was reduced. These symptoms were vertigo and nausea.

The success of Graves in relieving "flashes" with extracts of ovarian residue, that is to say, with extracts of that portion of the ovary remaining after the corpus luteum has been removed, compels the conclusion that the vasomotor stabilizing principle is resident in that portion of the gland at least. Novak employed corpus luteum for menopausal vasomotor symptoms and speaks of his results as "gratifying, if not brilliant." The principle is evidently present then with equal certainty in corpus luteum. Our persistent success in the relief of "hot flashes" with the desiccated whole gland suggests the absence of any antagonism between the vasomotor stabilizing principle in corpus luteum and that in ovarian residue and makes the therapeutic test for efficacy of a preparation as forcefully applicable to the desiccated whole gland as to its residual portion or corpus luteum.

We might well pause to reflect upon the fact that in the single clinical condition in which there is significant agreement as to the efficacy of ovarian therapy apparently equally good results came from the use of any portion of the gland or the whole thereof. There is no need for employing special portions of a gland when they manifest no specificity toward the condition we seek to remedy. Furthermore, there is a limit to the supply of these organic extracts and if clinicians will persist in unnecessarily prescribing portions of the gland not only will the cost of these portions be materially increased but the supply of these portions will mount beyond what could be reasonably accounted for by the total supply available from slaughter houses. This last statement must not be interpreted as a slur upon the integrity of those in the business of preparing glandular products; but it is offered as a reminder that every industry is handicapped by the presence in them of unscrupulous individuals.

In seeking to demonstrate the presence of therapeutic principles of unknown chemical nature as we are called upon to do in ovarian therapy we must seek to prepare the gland for therapy in a fashion to give the greatest likelihood of conserving those principles. Such preparation ideally demands the use of a technic calculated to preserve every chemical entity in the gland. The problem is one of desiccating bacteria laden perishable organic substances in a manner to conserve a multiplicity of widely dissimilar chemical entities as well as render them safe from deteriorating influences. We must ascribe to those principles chemical properties characterized by marked unstableness and seek to conserve them in spite of those properties.

We must hypothesize, therefore, the following physicochemical properties as of these unknown principles.

1. They are thermolabile; that is, easily destroyed by heat.
2. They are easily oxidized and reduced.
3. They are easily liquefied; especially important if we suspect the principles sought for as of lipoid character.
4. They serve as ready pabulum for bacterial life and so are readily destroyed by bacterial action.

The conditions for desiccation calculated to ideally meet the problem herein just advanced are simple in principle but apparently involve technical difficulties that tax the ingenuity of commercial driers; and it is this ingenuity, we take it, that sales representatives of organo-product manufacturers have reference to when they assert that they make the better or best product. I take it for granted that the glandular materials are submitted to drying soon after their removal from the animal. No greater period of time than 18 hours need elapse from slaughter chamber to dryer, the material being kept chilled in a refrigerator in the interim.

The precise conditions of drying under which our material was prepared were not hit upon by chance but were accepted as a result of efforts innumerable to discover the proper combination of circumstances suitable for the dehydration of foodstuff. This research was carried on at the Harriman Research Laboratory during the period of the war at the suggestion of the war department. The writers had no hand in the elaboration of this process but merely adopted it for desiccating glands believing it served admirably to conserve and preserve with a minimum amount of change in its chemical units perishable organic materials.

The essentials for an ideal process for drying glands for therapy are these:—and what is to be said for ovary is as strongly applicable to any gland in which we seek to preserve a principle of unknown chemical nature—

1. The drying is to be done at a temperature below that at which decomposition or conversion is likely to occur. This calls for desiccation under reduced pressure.
2. The prevention of oxidation by drying in a minimum of circulating air.
3. The process should operate to pull water out of the material causing it to dry from the inside out. Where drying takes place from the surface inward the surface forms a hard scale preventing the complete withdrawal of the water from the depths.
4. The drying should be sufficiently rapid to complete the process in a maximum of ten hours.

Essentials (1) and (2) are self-evident. The other two need elabo-

ration. Desiccation does not kill bacteria. Where complete desiccation of the central portions of the glandular materials have not taken place bacteria are supplied with a moistened nitrogenous pabulum when these central portions of the glands are brought in contact with bacteria after pulverization. Bacteria need amazingly little moisture at proper temperature to induce decomposition in organic substances. It is important then as the first safeguard against deterioration that the glands be thoroughly dried throughout their thickness.

As the drying must be done under low heat, dryers are incubators. Submitting a wet, bacteria covered gland to incubator temperature is inviting destruction by bacteria. Rapidity in desiccation is consequently necessary. Low temperature desiccation can be done in ten hours.

To protect properly desiccated glands against deterioration it is highly desirable that one keep the gland powder away from hydroscopic substances. For this reason we would advise against the practice of putting up glandular products in tablet triturate form since the tablet filler is usually a water soluble substance and may be relatively highly hydroscopic.

In what way and to what extent can the clinician investigate the manner of preparation of glandular products at his disposal? A vast amount of information can be secured from employing the following procedure. Secure a sample of the unpulverized desiccated materials* and immerse it in a tumbler of tap water for twelve hours. If the tissue has been properly desiccated it should absorb water and take on again the size and contour of the original volume. This is so because desiccation in vacuo should be carried on at a temperature estimated not to coagulate the protein. You have, therefore, by this procedure a means of checking up low heat desiccation as well as for ruling out the treatment with chemical agents that are in the nature of protein coagulants.

The material thus freshened with water should be prepared for microscopic examination after the manner of fresh material subjected to histopathological study. The ovary desiccated in the fashion outlined herein and subjected to microscopic examination after refreshening gives a picture that would hardly be distinguishable from truly fresh material were it not for the fact that desiccation tends to rupture the limiting membrane walls of parenchymatous cells. The differential staining values of nucleus and cytoplasm of the tissue cells are quite normal. This speaks much for the preservation intact of the many different chemical units in the tissue. It enables one,

*We assume the sample supplied receive no further treatment in preparation for marketing than the simple one of mechanical pulverization.

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too, to detect the use of fat solvents that are not protein coagulants for where the fat globules are dissolved away the microscope will disclose vacuoles.

One further test of a product can be applied. Smell the sample to detect the odor of rancid fat. Where desiccation has been slow, where the process has taken from 18 to 24 hours or more, bacteria may have been given the opportunity to induce some decomposition; or oxidation changes have occurred. Very small amounts of decomposed fat leave tell-tale odors.

SUMMARY

Ovarian therapy is still at the stage of administering to a patient an unknown quantity. The wide diversity of clinical opinion as regards the efficacy of ovarian therapy in this or that clinical condition points in our opinion to a crying need for standardization in preparation of the gland for use.

Our experience with desiccated whole gland quite conclusively suggests the presence in it of at least one active principle; that referable to the vasomotor system. The principle is detectable by its effect on the "flash" symptom. Whatever the phase of ovarian dysfunction one may be studying if one is administering ovarian gland be it the whole gland, ovarian residue or corpus luteum one ought to expect it to meet this one therapeutic test; namely, to dispel "flashes." It would, furthermore, be safest as assurance against deterioration that the ovarian powder be put up in capsule form at the initial source of supply in capsule containing about 5 grs. and sealed in packages of 50 and 100.*

*A comprehensive bibliography covering the subject matter of this report is to be found in Endocrinology and Metabolism: D. Appleton & Company, New York, 1922.

(*For discussion, see p.* 127.)

THE LIMITATIONS OF RADIOTHERAPY IN THE MANAGEMENT OF FIBROMYOMA OF THE UTERUS*

By James Albert Corscaden, M.D., New York, N. Y.

ONE of the greatest recent advances in gynecology has been the utilization of radiotherapy. About fifty per cent of those needing treatment for fibromyoma of the uterus have been saved from major operations. It is my purpose to outline those factors which, from an observation of about six hundred cases of myoma and uterine hemorrhage, have ruled out radiotherapy and have indicated operation. If we can sharply define what radiotherapy will and will not do, our choice of procedure will be easier.

The action of radium and x-ray is readily understandable if we believe that life growth and physiological activity of a cell are physical chemical manifestations and are governed by the laws of physics and chemistry.

According to the electronic theory of the composition of matter, which seems to be universally accepted by the chemists, chemical change depends on the manipulation of the electrons composing the atom.

Radium furnishes three forms of energy, the positively charged alpha particle, the negatively charged beta particle and the electromagnetic gamma ray. The x-ray furnishes us with only an electromagnetic wave. These have the power of dislodging the electrons in various atoms and in consequence produce chemical change.

We all know how variable is the action of heat and light on different substances. So in the body there is a marked variation in the reaction of the tissues to radium and x-ray instanced in the reproductive system by the graafian follicle which is about five times as readily injured as is the skin.

When a tube of conventional shape containing fifty milligrams of radium is left in the cavity of the uterus for twenty-four hours there occur:

1. A slough of the endometrium about 1 centimeter wide, three centimeters long, and two or three millimeters deep. There is subsequently a slight inflammatory reaction with discharge.

2. A replacement of the elastic tissue and smooth muscles of the blood vessels and uterine muscle by connective tissue.

3. A degeneration of myomatous tissue for a depth of about 1 centimeter.

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*Read at a meeting of the Section on Obstetrics and Gynecology, New York Academy of Medicine, February 27, 1923.

4. Destruction of the mature graafian follicles which causes:
   a. Cessation of menstruation.
   b. Consequent atrophy of the uterus and of myomata with replacement by hyaline connective tissue.
   c. Loss of part of the internal secretion of the ovary with whatever consequences that may have.
5. Injury to the bowel and bladder (not observed in my experience).
6. Change in the blood count (also not observed).

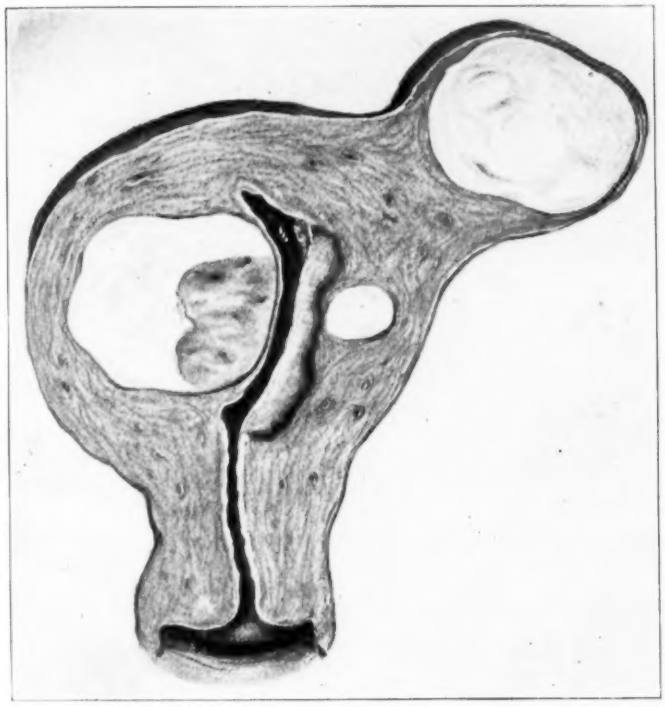

Fig. 1.—Semidiagrammatic drawing of a uterus twenty-seven days after 50 milligrams of radium in a silver capsule, protected by 1 millimeter of rubber were placed in the uterine cavity. There was a slough varying in depth from 1 to 3 millimeters and averaging a little less than 1 centimeter.

These seem to be the actual tissue and physiological effects. Turning to their practical application in the management of fibromyoma of the uterus we are met with more than the simple problem of an anatomical or physiological experiment. We face questions of (1) diagnosis, (2) the nature and potential menace of the tumor, (3) the relief of the symptoms, (4) possible disagreeable effects of the method of treatment, (5) the question of childbearing.

1. Of all these I think the first is of the greatest importance. Before applying radiotherapy in an individual who is a good operative risk, the diagnosis must always be nearly absolute because, in the alternative method of treatment by excision, an exploratory celiotomy

is included. This problem was more acute a few years ago than it is now. At that time the majority of gynecologists were ignorant of radiotherapy and for the most part opposed to it. The management of the problem lay between the family doctor, the patient, and a radiologist. The results of such divided responsibility are illustrated by the following instances:

A competent gynecologist made a diagnosis of fibromyoma of the uterus. The patient persuaded the family doctor to refer her to a prominent radiologist, who gave her a thorough course of x-ray treatments on the diagnosis given to him. At the end of a year the mass had not receded. Operation revealed a dermoid cyst with actively proliferating tissue.

To one of the leading radiologists of this city came a patient with a letter from a prominent Boston physician requesting that she be given the regular x-ray treatment for myoma. On taking a history it was found that the diagnosis had been first made ten years previously, the last vaginal examination had been made four

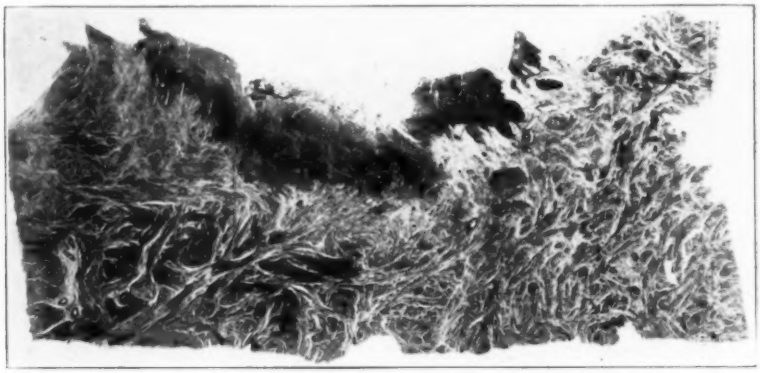

Fig. 2.—Low power microphotograph showing radium slough in Fig. 1.

years previously, and the woman had not menstruated for two years. She had a small retroverted uterus which contained a stony hard mass, three or four centimeters in diameter. Nature had accomplished all that radiotherapy could do.

The second phase of the diagnosis is the exclusion of dangerous complicating pathology. In my experience this has narrowed down to the exclusion of extrauterine and intestinal tumors on the one hand and to carcinoma of the body and epithelioma of the cervix on the other hand. We have discovered during the final examination on patients possessing a myoma of the uterus or suffering from uterine bleeding, diverticulitis of the sigmoid, carcinoma of the rectum, and dermoid and several simple cysts of the ovary, as well as epithelioma of the cervix and carcinoma of the corpus uteri. Contrary to the opinion often expressed, I do not fear chronic inflammations. I have cured by x-ray one tuberculous sinus following salpingectomy (followed 7 years) and have treated with massive x-ray dosage, two cases of large myoma of the uterus, complicated with massive adhe-

sions due to chronic salpingitis (in one case, tuberculous). This was done after an attempted hysterectomy had been abandoned because of the technical difficulties. No apparent harm resulted. Several cases of tuberculous peritonitis of tubal origin have been markedly improved.

To summarize: If at the end of an examination under anesthesia

Fig. 3.—Section taken from fundus in Fig. 1. It shows the uninjured character of the endometrium and still shows the hyperplasia which existed before the radium was applied.

and diagnostic curettage, extrauterine tumor cannot be excluded, the abdomen should be explored. Carcinoma and epithelioma are more easily excluded by the curette and if found properly handled.

2. The nature and potential menace of the tumor. A myoma is benign and needs no treatment until suspicious changes occur. This is in accord with the management of many other benign tumors, such as warts and moles. When however degeneration or inflammation is evidenced by toxic symptoms, anemias, unexplained by hemorrhage

or loss of flesh and strength, with or without local pain or tenderness, or rapid increase in size of the tumor, the mass becomes a potential menace and should be removed. Rapid growth might also signify sarcoma, and even without other contributing factor indicates laparotomy. Masses of large size (over 12 to 15 centimeters) I believe show a higher incidence of degeneration and should also be removed.

3. Symptoms needing relief have been bleeding, dysmenorrhea, pains of many varieties in location and character, urinary disturbances and venous obstruction of the lower extremities. Another factor is the deformity caused by the mass. Many tumors reach large size without symptoms and may become a source of embarrassment to the woman.

Bleeding is the symptom *par excellence* amenable to radiotherapy.

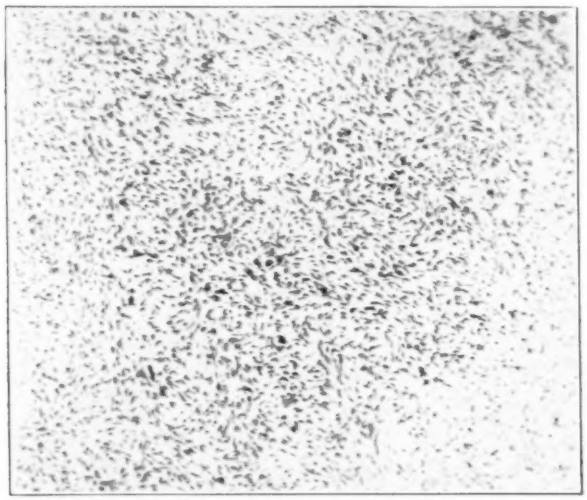

Fig. 4.—Section of an ovary removed from a girl of twenty-two years, who had had x-ray treatment over a period of seven years. She had not menstruated for over four years. The stroma is nearly normal. The section was taken from the cortex but nevertheless shows complete absence of the follicles.

It will not stop, however, if the destruction of the follicles has not been sufficient to stop menstruation, or if the endometrium has not been largely destroyed. Underdosage may be deliberate. The effort is made to modify the bleeding without stopping it entirely, small doses being given with the idea that the local effect is the important one. Our specimens, showing the limited local reaction, would not bear this out. I have tried this method in only a few cases. In only one did the mass recede while menstruation persisted. The bleeding rarely becomes regular and the patients require more or less frequent examinations. The mental condition of these patients is bad. The reappearance of the bleeding arouses the fear that the original hemorrhages will return. They lose confidence in the original operator

and in the method no matter what prognosis has been given. In my opinion, if there is any objection to the sterilizing dose and the woman is a good surgical risk, operation should be performed. Other causes of underdosage are:

a. Failure to appreciate the law of inverse squares. An ovary lifted away from the uterine cavity will require more of a dose than one that is normal in its position. If twice as far, four times as much. A radium tube slipped into or placed in the vagina will give a different dosage to the ovaries from one high in the fundus.

b. A broken radium tube gives off only part of its available energy

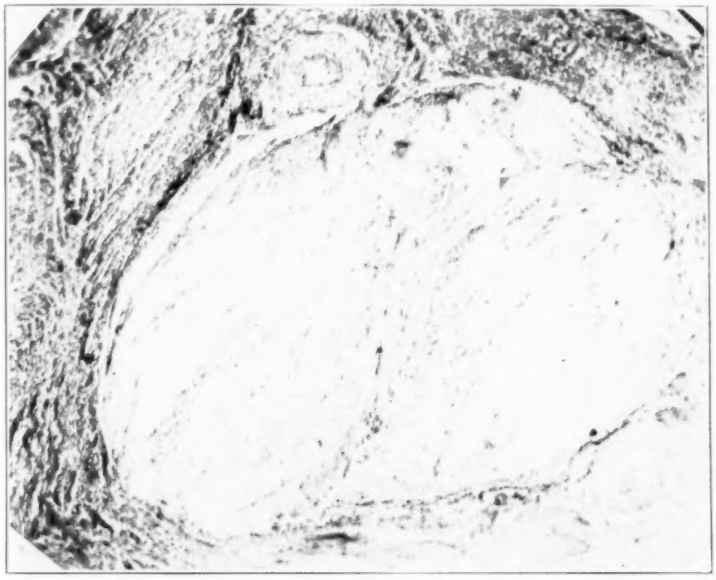

Fig. 5.—Section of a fibromyoma after treatment eight years previously with x-ray, when it measured about 12 cm. in diameter. At autopsy, done for myogenous leukemia; all that could be found of the mass treated was a nodule about 1 cm. in diameter, consisting of hyaline tissue.

because of the escape of a considerable portion of the emanation and consequent loss of the active degeneration products.

Bleeding may not stop with cessation of menstruation if ulceration such as occurs in a protruding and traumatized polyp is the cause of the bleeding. A myoma, pedunculated and hanging out of the cervix or even still intrauterine might be eroded and would bleed irrespective of menstruation. The most difficult variety upon which to pass is the small submucous tumor projecting into the uterine cavity. One must judge whether, after the menopause, this will continue to be traumatized sufficiently to cause bleeding. If so it is better removed. Blood vascular disease such as pernicious anemia, congenital familial telangiectiasis may also continue to cause bleeding from the uterus

after the menopause as well as from the other delicate membranes of the body.

Dysmenorrhea has always ceased with the onset of amenorrhea. On the other hand severe pain unassociated with menstruation has only occasionally stopped (30 per cent). In the operated cases pain associated with a uterine tumor smaller than a four months pregnancy has usually been due to causes outside of the uterus (appendicitis, cholelithiasis, salpingitis) and consequently would not always be relieved by the shrinkage of the uterine mass.

Urinary symptoms have been equally refractory. I have not compared this result with that following operation but I am under the impression that it is not as good.

4. The dangers and discomforts of the method. Dilatation and curettage followed by radium are not without danger. One woman died of pulmonary embolism 20 hours after operation. This must be attributed to the curettage and not to the radium. Two patients had sloughs in the uterine cavity and required treatment. There were three cases of fever and parametritis due, I believe, to operative infection and not to the lighting up of an old focus. They were uterine and broad ligament processes rather than tubal. Furthermore no such condition has followed x-ray exposures in our hands. A few cases showed albumin and casts, particularly after x-ray. All had some toxemia with nausea and vomiting. Of the remote menopause symptoms, only hot flashes and nervousness were of any importance. The discomfort caused by flashes is usually slight, rarely distressing. Properly instructed, a woman rarely will need treatment by ovarian extracts. The patient must be warned of them however because they begin suddenly and if unlooked for, cause considerable apprehension.

Severe nervous manifestations have occurred in five women. All of them had more or less severe nervous manifestations before the treatment, were worse for several months after and in all but one case recovered or bettered their previous nervous condition.

Our experience corresponds with the observations of Adler on the so-called "involutional psychosis" of the natural menopause. He says in his book on the "Neurotic Constitution" that the psychoses of this period occurred in women who had previously shown definite abnormal nervous symptoms.

In women with an unbalanced nervous mechanism, especially those who have given signs of a decided nervous disorder, the artificial menopause should only be induced after a competent neurologic consultation. If under these circumstances radiotherapy is then given, there should be a well planned prophylactic and postoperative course of psychotherapy. Ovarian extract is of little help.

We have not observed any of the vague anemias, trophic and meta-

bolic changes sometimes attributed to the absence of menstruation. Blood pressure was slightly elevated in some of the women over forty years of age but in none of those under that age.

Of the possible late changes in a myoma, sarcoma is the most important. I can find in the literature only three such cases.[1, 2, 3] Two of these were found in from three to six months after x-ray treatment and seem to have been mistaken diagnoses in the first place. This insignificant number removes sarcoma as a danger. In the cases treated there have been no degenerations or inflammations. Accidents such as torsion may well occur, but have not been observed.

5. Effect on childbearing. Only two patients have become pregnant.

One woman of thirty-seven with a myoma eight to ten centimeters in diameter received 1200 milligram hours intrauterine. She later became pregnant, miscarried at six months, had a perfectly formed macerated fetus, ran a peculiar long septic course without demonstrable pathology and recovered. I believe the cause of the miscarriage to lie in the local sclerotic changes in the endometrium and muscle added to the mechanical abnormality incident to the myoma. The other was a woman of twenty-four years referred by the late Doctor Cragin for excessive bleeding. She had no gross abnormalities of the uterus. She was given a moderate dose of x-ray. Her periods became normal in amount, slightly irregular in periodicity. Three years later she became pregnant and gave birth to an eight and one-half pound boy, perfectly formed. He is now three years old and healthy.

The problem of future childbearing may be approached from two directions: first, the effect of radiotherapy on the uterus and second, the effect on the ovum. Radium as demonstrated above produces a slough with scars in the endometrium and sclerosis of the vessels and myometrium. These uteri are not pliable. I know of one uterus treated by radium in which the cervix ruptured while dilating over the head and caused death by hemorrhage. The x-ray on the other hand has only a mild action on muscles and vessels. I see no objection, from this standpoint, to giving moderate doses of x-ray through the abdomen.

The effect on the ovum, however, is much the same with either method. There is some evidence that injury without destruction of an ovum may alter the development of the embryo so as to cause physical abnormalities and disturbances of growth and mentality. Nevertheless some mothers have gone through the ordeal and produced perfect children. I should therefore say that with a view to future pregnancy, x-ray in nonsterilizing doses to patients suffering from bleeding without myoma is justifiable when hysterectomy is the only

alternative, but that where a myoma is responsible for the bleeding, myomectomy is preferable.

CONCLUSIONS

1. In the treatment of myoma of the uterus by the radiotherapy the selection of the case is the most important phase.

a. Responsibility should be undivided.

b. Extrauterine neoplasms and malignant growths of the uterus must be excluded. Chronic adnexal inflammation so light as to escape diagnosis need not be a deterrent.

c. Symptoms of toxemia, anemia unexplained by loss of blood, local pain, tenderness, change in consistence of the tumor, rapid growth, and large size may indicate inflammation, degeneration or sarcomatous change and demand excision.

2. Of the symptoms associated with myoma:

a. Bleeding due to ulceration (polyps, submucous, pedunculated myomata) or blood vascular disease (pernicious anemia, familial telangiectasis) may not cease with the onset of the menopause. In our experience all others will.

b. Pain associated with menstruation will cease but pain occurring at other times may not.

c. Urinary disturbances are not well relieved.

d. Shrinkage of a myoma will almost always follow adequate doses of radium and x-ray but the discomforts of the dosage necessary coupled with the potential danger in the large mass make operation preferable.

3. Doses of radium and x-ray insufficient to induce a menopause are unsatisfactory. The mass may fail to shrink. The effect on the bleeding is uncertain. The mental reaction of the patient is bad.

4. Hot flashes are constant and slight increase in nervous irritability is frequent after radiotherapy. The former are not important. The latter demands caution in using the method in women who show any mental abnormality.

5. Childbearing is possible after radiotherapy.

a. Radium should never be used in a woman who may become pregnant. The sclerotic changes predispose to dystocia.

b. X-ray may disturb the structure of an ovum and determine abnormal structure or development of the fetus. It should only be used where hysterectomy is the only alternative.

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(*For discussion, see p.* 129.)

DEXTROVERSION OF THE UTERUS, WITH CONGENITAL ABSENCE OF LEFT FALLOPIAN TUBE, OVARY, BROAD LIGAMENT, ROUND LIGAMENT, KIDNEY AND URETER*

By Walter T. Dannreuther, M.D., F.A.C.S., New York City

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ALTHOUGH the genital malformation described in the appended case report may have no special significance, it is of interest because of its extreme rarity. Congenital absence of one tube or ovary is not unusual, but complete absence of both the broad and round ligaments on one side, particularly without a concomitant uterine developmental defect, is very rare, and a full-term pregnancy occurring in the presence of such a genital malformation is at least unique. While partial development of adnexa may be due to fetal peritonitis, total absence is unquestionably due to prenatal arrested growth. My patient was distinctly undernourished and underdeveloped physically but showed no evidence of either hereditary or acquired syphilis.

Case 26591: R. B., aged twenty-five, married five years, began menstruating during her thirteenth year. Before her marriage there were intervals of six to eight weeks between the menstrual periods, but since then the flow has been fairly regular every four weeks. Three years ago she was delivered of a healthy, full-term child, which she nursed for nine months. The child is still living. She has had two miscarriages: one two years ago and one eight months ago. They were both spontaneous at the eighth week. No curettage was done in either instance, and the patient has never been operated upon before.

Mrs. B. entered the hospital complaining of pain in the right lower abdominal quadrant, not increased during menstruation, occasional nausea after meals, constipation, leucorrhea, and some discomfort in the sacral region. These symptoms had been present for about two years.

On examination, the thyroid was found to be slightly enlarged and prominent, but apparently causing no symptoms. The lower pole of the right kidney was palpable, but the left kidney could not be felt. There was hyperalgesia at Morris' point on the right side, and tenderness on pressure over McBurney's point. The perineum was intact and all the external genitals were normal. The cervix was irregularly lacerated, with considerable ectropion, and evident hypersecretion. Cervical smears were negative for pyogenic microorganisms. The uterus was dextroverted, normal in size and consistency, and symmetrical in outline. Its mobility was limited, however, and bimanual manipulation was distressing to the patient. The adnexa were not palpable on either side.

Preoperative diagnosis: Chronic appendicitis, pelvic adhesions, dextroversion of the uterus, and lacerated cervix.

*Presented before the Section of Obstetrics and Gynecology, New York Academy of Medicine, February 27, 1923.

Operation: December 12, 1922. After a trachelorrhaphy, the abdomen was opened in the usual manner through a suprapubic longitudinal incision. After clearing the pelvis of intestines, I discovered that the appendix was thickened and firmly adherent to the right tube and ovary. The latter organs themselves, however, were normal in every respect, as were the right broad and round ligaments. The

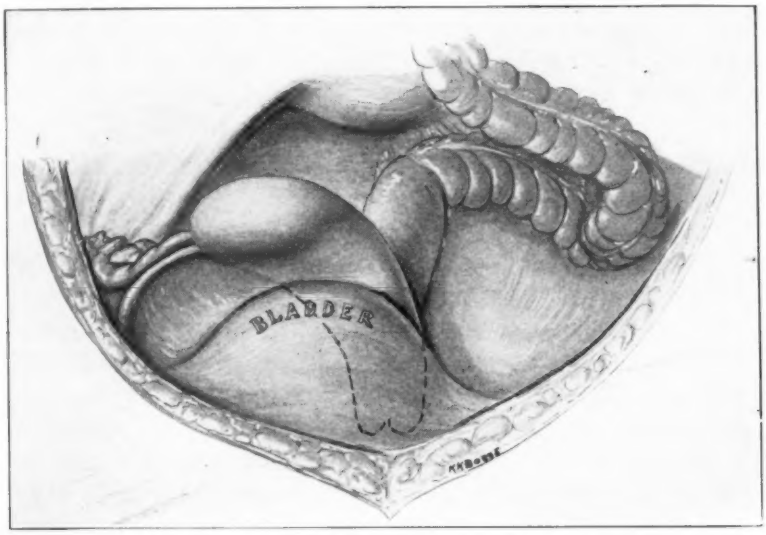

Fig. 1.—Semidiagrammatic drawing of the pelvic abnormality disclosed by laparotomy: The uterus is dextroverted, but normal in size and consistency, and symmetrical in outline. The right adnexa are normal. The left broad ligament, round ligament, tube, and ovary are absent. The bladder assumes its normal relation to the uterus on the right side, but follows the margin of the uterus downward on the left side to the level of the internal os, where it merges with the parietal peritoneum. Dense adhesions binding the chronically inflamed appendix to the right adnexa are purposely omitted in the illustration.

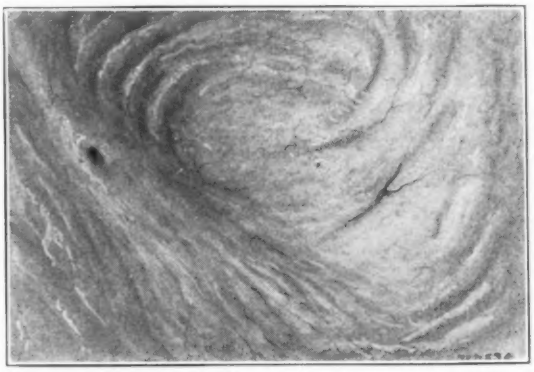

Fig. 2.—Cystoscopic view of the region of the trigone. The right ureteric orifice is seen in its proper location. The upper limit of the vascularization of the trigone slopes gradually toward the left side of the vesical neck. There is no left ureteral opening and no interureteric ridge.

adhesions were cut between clamps and the appendix removed. It was then noticed that the uterus remained dextroverted despite its release, and that the left broad ligament, round ligament, tube and ovary were entirely absent. The peritoneum covering the bladder followed the left margin of the uterus down to the vaginal

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vault and then merged with the parietal peritoneum, as depicted in Fig. 1. The left iliac fossa was empty, except that it might have been occupied by the sigmoid and rectum before they were dislocated upwards by the laparotomy gauze pads. No left ureter could be palpated or otherwise identified.

The patient made an uneventful recovery from her operation, and was persuaded to return for a cystoscopic examination. This revealed a normal ureteric orifice, in its proper location, on the right side of the bladder, but there was no interureteric ridge, and not even a line of demarcation between the trigone and posterior portion of the bladder floor (Fig. 2). The upper delineation of the vascularization of the trigone sloped gradually from the right ureteric orifice to the left side of the vesical neck, and was not characterized by the usual concave curve. There was no ureteral opening on the left side, and in the area in which it is normally situated the bladder was unusually pale. Two or three small capillaries only were found in this region. Absence of the left ureter was verified by a subsequent indigo-carmine test, the dye issuing from the right ureter in a forcible, highly colored stream, but not elsewhere.

The patient has persistently refused to submit to an x-ray examination of the urogenital tract, so that a positive diagnosis of absence of the left kidney cannot be established. In view of the other clinical evidence, however, I believe that the existence of a solitary kidney may be presumed.

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INSUFFLATION OF UTERUS AND FALLOPIAN TUBES*

Report of 600 Cases Examined By The Rubin Method

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A STUDY of the Rubin method for the determination of tubal patency was begun at the Woman's Hospital two years ago.

The apparatus and technic which were adopted for this study were essentially the same as originally described by Rubin.[1] The apparatus as shown in the diagram (Fig. 1) consists of a pressure tank (A) filled with carbon dioxide; a reducing valve (B); a 40 c.c. siphon flow meter (C) which is immersed in tap water in a wide-mouthed one liter bottle (D); a mercury manometer (E) and an intrauterine canula (F). The intrauterine canula (F) consists of a Keyes Ultzmann Canula over which the rubber tip of a male anterior urethral syringe has been fitted to close the cervical canal. The outlet of the reducing valve (B) is connected to the inlet of the siphon flow meter (C) by pressure tubing (G) upon which is placed a compression clamp (H). The mouth of the one liter bottle is made air tight by a two-hole rubber stopper (I). The inlet of the siphon flow meter (C) is passed through one hole of the two-hole rubber stopper and a glass "Y" tube is passed through the other. The glass "Y"

*Read in abstract at a meeting of the New York Obstetrical Society, January 9, 1923.

tube is connected one way with the mercury manometer (E) by pressure tubing (L) and the other way with the intrauterine canula (F) by pressure tubing (M) leading to the intrauterine canula.

By use of this apparatus the following important details in the technic can be accurately controlled and a maximum amount of information obtained from examination:

1. A constant low pressure of gas can be automatically maintained by the reducing valve (B).

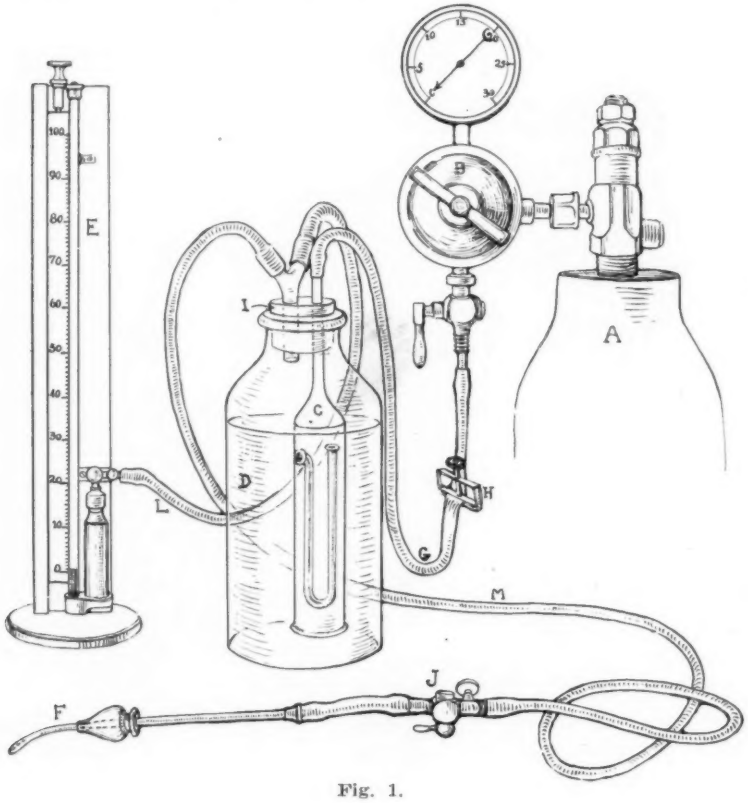

Fig. 1.

2. The rate of flow of the gas can be accurately regulated by means of the compression clamp (H) on pressure tubing (G).

3. The volume of gas which passes into the abdomen can be measured by the siphon flow meter (C).

4. Intrauterine pressure can be recorded by means of the mercury manometer (E).

In this study cases were classified as patent, partially occluded, or occluded according to the level of intrauterine pressure at which gas passed through the fallopian tubes into the abdomen. For the purpose of this study the levels of pressure suggested by Rubin were adopted. That is:

1. If gas passed into the abdomen at an intrauterine pressure below 150 mm. the tubes were considered patent.

2. If a pressure of 150 mm. or more was required before gas passed into the abdomen the tubes were classified as partially occluded.

3. Manometer readings of 200 mm. on repeated trials were considered to indicate occluded tubes.

These levels of pressure for the classification of cases depend upon one very important point in technic, namely, the rate of flow of the gas. Any slow rate of flow may be safely used but levels of pressure indicating patent or partially occluded tubes must be determined for the rate of flow of the gas used during the examination. That is, during inflation of the uterus and tubes gas is allowed to accumulate under pressure in an enclosed chamber, the uterus, which has a narrowed outlet represented by the tubes. Practical experience has shown that, when the gas flows at a very slow rate, a drop in the intrauterine pressure, indicating that gas has passed into the abdomen, occurs at a lower level than when the gas is allowed to flow at a more rapid rate. As stated above the tubes were classified as patent, or partially occluded according to the level at which the pressure fell. The necessity for adopting a known uniform rate of flow of the gas to determine the condition of the tubes is therefore apparent. In this series a rate known as 20 to 100 suggested by Rubin was adopted. This rate of flow of the gas is obtained before the examination is begun. To obtain this rate of flow—

1. Regulate the reducing valve (B) so that it will maintain ten pounds of pressure.

2. Close the release valve (J) making the pressure system air-tight.

3. Adjust the rate of flow by means of the compression clamp (H) so that a pressure of 100 mm. will accumulate in 20 seconds as indicated by the manometer.

4. The release valve (J) is then opened until the canula is adjusted in the cervical canal.

In this way the exact rate of flow of the gas can easily be obtained before the examination is begun. It is a much more accurate method to determine the rate of flow than to count the number of pulsations or excursions of the gas in the siphon flow meter.

The technic of the examination has been kept as simple as possible. The patient is examined in the lithotomy position. Exposure of the cervix is obtained with a bivalve speculum. The cervix and cervical canal are painted with 3.5 per cent iodine. The anterior lip of the cervix is grasped crosswise with a bullet forceps in order to leave the canal unobstructed. The intrauterine canula is then inserted into the canal. The rubber syringe tip which has been placed over the end of the canula is made to fit into the canal as firmly as

possible, by gentle downward traction on the cervix with bullet forceps. The screw release valve is then closed and the manometer will immediately begin to register intrauterine pressure.

We have three ways of knowing whether gas has passed into the abdomen during examination:

1. Pressure findings:—A drop in intrauterine pressure during the examination, if there has been no leak around the canula in the cervix, means that gas has passed through one or both tubes. An intrauterine pressure of 200 mm. on repeated trials indicates that both tubes are closed.

2. Shoulder pain:—As soon as the patient assumes the upright position she may have pain in one or both shoulders. This symptom is present in over 90 per cent of the cases in which gas has passed into the abdomen and is very positive evidence that the tubes are patent.

3. Fluoroscopic examination:—If a patient is examined in the upright position with the fluoroscope after gas has passed into the abdomen a layer of gas can easily be seen beneath the diaphragm.

At first all cases were routinely examined with the fluoroscope to determine whether gas has passed into the abdomen. This was later given up except in cases where the patient had no shoulder pain. Many patients are very apprehensive and fear examination on account of the pain which it may cause. Most patients do have some discomfort during the examination. As soon as they assume the upright position a high percentage of the cases in which gas has passed into the abdomen have shoulder pain which may be rather severe. If they are then taken into the dark room for fluoroscopic examination a certain number will faint as a result of fear and shoulder pain. After 200 cases had been insufflated and routinely examined with the fluoroscope it was decided that if a definite drop in intrauterine pressure during the examination was followed by shoulder pain, no further proof that gas has passed into the abdomen was necessary. It is undoubtedly advisable to examine patients with the fluoroscope if a drop in pressure occurs which is not followed by shoulder pain.

The volume of gas which has passed into the abdomen can easily be measured by counting the number of pulsations or excursion of the gas in the siphon flow meter. Forty cubic centimeters of gas pass into the abdomen with each excursion. About 240 c.c. of gas are used during an examination. Carbon dioxide is absorbed so rapidly from the abdomen that symptoms from the amount used in the ordinary examination disappear after fifteen to thirty minutes.

Patients have not been examined in the presence of profuse purulent or bloody vaginal discharge. Examination should not be at-

tempted in patients who have acute pelvic inflammatory disease or serious organic heart disease.

Too much reliance should not be placed on one examination if pressure findings indicate any degree of obstruction to the passage of gas through the tubes. The results of an examination, when a patient is near her menstrual period, are not reliable. She should not be examined within one week before or after her period. The congestion of menstruation may cause partial or complete obstruction of the tubes. Although a patient's periods may be normal and regular almost every woman has irregular periods at some time during her menstrual life. Therefore we can never be absolutely sure at one examination that we are not too near a menstrual period. For some reason certain cases will be found occluded at one examination and patent at subsequent examinations. If we find the tubes obstructed at one examination and we can find no cause for the obstruction, the patient should be examined at least twice more on different occasions before a definite decision is made in regard to patency of the tubes.

The test has been used mainly for four purposes:

1. To determine the patency or nonpatency of the fallopian tubes in cases of sterility.
2. To determine the patency or nonpatency of the fallopian tubes as an indication of their involvement in chronic pelvic inflammatory disease or other pelvic pathology when the diagnosis has been uncertain by bimanual pelvic examination.
3. To assist in keeping the tubes open following conservative operative procedures.
4. To determine the ultimate success of operative procedures for opening obstructed tubes.

The results of 600 cases which were examined can be classified as follows:

Primary sterility cases	236
Secondary sterility cases	119
Cases with indefinite pelvic conditions	112
Cases having laparotomies after insufflation	108
Cases examined after pelvic operations (follow-up cases)	25

An analysis of the results of insufflation in 236 cases complaining of primary sterility is as follows:

Tubes patent in 79 cases or 33.4 per cent.
Tubes partially occluded in 69 cases or 29.1 per cent.
Tubes occluded in 88 cases or 37.2 per cent.

In other words 66.5 per cent of the patients complaining of primary sterility had either partial or complete tubal obstruction.

The bimanual pelvic examinations were negative in 44 per cent of the primary sterility cases.

Of the primary sterility cases with negative bimanual examinations, 29.5 per cent had either partial or complete tubal obstruction.

An analysis of the 119 cases of secondary sterility is as follows:

Tubes patent in 56 cases or 47 per cent.
Tubes partially occluded in 26 cases or 21.9 per cent.
Tubes occluded in 37 cases or 30 per cent.

Of the secondary sterility cases 17.4 per cent had either occluded or partially occluded tubes in spite of negative bimanual pelvic ex-examinations.

These statistics point out definitely the value of the method for the diagnosis of a frequent cause for female sterility. It was rather surprising to find the tubes partially or completely obstructed in such a high percentage of sterility cases in which the physical examinations were negative.

The patency of the tubes was studied in 112 cases to determine whether they were involved in chronic adnexal disease. The results were as follows:

Tubes patent in 54 cases or 48.2 per cent.
Tubes partially occluded in 20 cases or 17.8 per cent.
Tubes occluded in 38 cases or 33.8 per cent.

Of the cases with partially occluded or occluded tubes 18.9 per cent had negative bimanual examinations.

The cases having laparotomies following insufflation may be analyzed as follows:

Twenty-one (21) cases were operated for retroversion in which the tubes appeared to be normal. Although the tubes appeared to be normal, 42.8 per cent showed partial or complete tubal obstruction before operation. This undoubtedly explains why certain cases of retroversion are sterile. Insufflation would help to indicate which of these cases should be operated although they are free from symptoms other than sterility.

Other cases in which the results of insufflation were checked at operation included:—

31 cases of chronic pelvic inflammatory disease
36 cases of retroversion complicated by chronic pelvic inflammatory disease
10 cases of fibrosis uteri or small multiple fibroids
4 cases in which the tubes were convoluted and of the infantile type.

A large percentage of the pelvic inflammatory cases had definitely occluded tubes at operation. The cases which showed the tubes to be partially occluded when examined by the Rubin method proved

to have either one tube open and one closed or both tubes kinked or partially occluded by pelvic adhesions. In certain cases the tubes appeared normal except for congestion. It is possible to have rather marked peritoneal adhesions which do not obstruct the fimbriated ends of the tubes or occlude them by congestion or kinking.

In myomatous uteri the tubes may be partially or completely obstructed without showing disease at operation.

Three out of four of the cases in which the tubes were convoluted and of the infantile type showed complete occlusion when examined before operation.

Insufflation showed the tubes freely patent in three cases operated for right salpingitis and in two cases operated for bilateral salpingitis. Appendicitis caused the symptoms in two of the cases, a unilateral cystic ovary in one case and bilateral cystic ovaries with varices of the broad ligaments in two cases.

As stated above cases were classified as patent, partially occluded or occluded according to the level of pressure at which gas entered the abdomen. It was found early in this study, when cases were examined at operation after insufflation, that a definite single level of pressure could not be obtained, below which it could be said that tubes were normally patent and above which it could be said that some obstruction existed. One fact which was uniformly very striking was that tubes were very easily obstructed. Any condition which produces congestion of the pelvic organs such as menstruation, uterine displacements, pelvic inflammatory disease, myomata uteri, fibrosis uteri or ovarian neoplasms may cause partial or complete obstruction of the tubes. It was assumed for this reason that it would be possible to find a very low level of pressure which would indicate that both tubes were not only patent but normal. On the other hand, if a high level of pressure were required on repeated examinations before gas entered the abdomen, some obstruction must be present. Although the series of cases operated following insufflation is still small, the findings indicate that—

1. If gas passes into the abdomen at an intrauterine pressure of 100 mm. or below at 20 to the 100 rate of flow, we may be sure that both tubes are patent and normal.

2. If an intrauterine pressure of 150 mm. or more is required on repeated examinations before gas enters the abdomen, we may be sure that some cause for obstruction exists whether it can be felt by bimanual examination or not.

3. When gas enters the abdomen between 100 mm. and 150 mm. of intrauterine pressure, we must combine our pressure findings with other means of diagnosis to determine the condition of the tubes.

It is interesting to note in this series of 600 cases that gas entered the abdomen:

At 100 mm. or less of intrauterine pressure in 142 cases of 23.6 per cent.
Between 100 and 150 mm. intrauterine pressure in 91 cases or 15.3 per cent.
Between 150 and 200 mm. intrauterine pressure in 157 cases or 26.1 per cent.

The tubes were occluded in 210 cases or 35 per cent.

In other words we could be reasonably certain that both tubes were normal in 23.6 per cent of the cases and that there was some cause for partial or complete obstruction in 61.1 per cent of the cases. The percentage of cases in which gas entered the abdomen between 100 and 150 mm. was small, 15.3 per cent. This represented the cases in which the method did not give definite information as to the condition of the tubes.

As stated above, the tubes are very easily obstructed. Therefore when we find them freely patent we may be quite sure that they are also normal. If any obstruction is present at repeated examinations, some cause for obstruction is also present, whether we are able to find it or not by physical examination. As seen from the above statistics the method was of definite value in determining the condition of the tubes in 84.7 per cent of the cases examined.

There are undoubtedly conditions which obstruct the passage of gas through the tubes which cannot be seen when the tubes are examined at operation. This is particularly true in the presence of uterine displacements. As noted above 21 cases were operated for uncomplicated retroversion in which the tubes appeared to be normal, although 42.8 per cent showed partial or complete tubal obstruction when examined before operation. It has frequently been observed that cases examined too near a menstrual period had partially or completely obstructed tubes. If the same cases are examined at a later date well away from their periods, the tubes are normally patent and would probably appear normal to inspection. It is obviously impossible to say that tubes are patent because they appear normal to inspection.

A summary of the examination of twenty-five cases following pelvic operations, "follow-up cases," is as follows:

Both tubes removed, 5 cases, partially occluded, 3, occluded, 2.
One tube removed, 4 cases, partially occluded 2, occluded 2.
Both tubes resected, 4 cases, occluded, 4.
One tube resected, 3 cases, patent, 1, partially occluded, 2.
One tube removed and one tube resected, 4 cases, occluded, 4.
Salpingostomy, bilateral, 2 cases, occluded, 2.
Cases operated for adherent retroversion, 3, patent, 1, partially occluded, 2.

This very small series seemed to indicate in the cases examined that where the tubes were seriously enough involved to require bilateral resection, bilateral salpingostomy or the removal of one tube and

resection of the other, operation failed to open them or to keep them open. A total of ten such cases was examined and all were found occluded. It is also interesting to know that gas entered the abdomen in three out of five cases that had had bilateral salpingectomy.

The test has been used to follow cases of acute pelvic inflammatory disease treated nonoperatively. One case was confined to the hospital for seventeen days with severe pelvic pain, temperature and leucocytosis. Examination at that time showed bilateral tender pelvic masses. She was insufflated one year later when she was entirely free from symptoms. The pelvic examination was negative and the tubes were found freely patent.

A small number of cases were insufflated at intervals following conservative operative procedures on the tubes. These cases were insufflated in order to prevent the tubes from becoming closed by adhesions as they healed. In the small number of cases followed the results have not been encouraging. In three cases the tubes were patent after operation but gradually closed as shown by subsequent examinations.

It has been of considerable interest to follow the sterility patients who had been insufflated to see if conception would result, from opening obstructed tubes. Nine persons who were insufflated, subsequently became pregnant. Other pregnancies may have occurred in cases which we have been unable to follow. The histories of the cases which became pregnant may be briefly summarized as follows:

1. Mrs. A. K., No. 22866 age twenty-nine, married three years. Never pregnant. Dysmenorrhoea. Anteflexed uterus and endocervicitis. Date of insufflation, August 10, 1921, maximum pressure, 115 mm. Last period before pregnancy October 17, 1921. Last visit to the clinic, February 16, 1922, then four months pregnant.

2. Mrs. A. L., No. 27979. Age twenty-one, married six years. Never pregnant. Leucorrhea, marked endocervicitis. Date of insufflation, May 4, 1921. Maximum pressure 104 mm. Operation May 9, 1921, tracheloplasty, Sturmdorf. Pregnant three months after operation. Examined nine months after operation. Uterus was then the size of six months pregnancy, fetal heart heard.

3. Mrs. E. L., No. 27227. Age twenty-five years. Married four years. Never pregnant. Pain in both lower quadrants. Operation February 4, 1921, appendectomy, separation of peritoneal adhesions. Date in insufflation December 28, 1921. Maximum pressure with each of first two trials, 250 mm. Gas passed into the abdomen at 180 mm. with the third trial. Last menstruation May 15, 1922. Patient last seen in clinic September 27, 1922. She was then four months pregnant.

4. Mrs. M. M., No. 27599. Age thirty-two. Married eight years. Had had five induced abortions, the last three years ago. Complaints, sterility and leucorrhea. Endocervicitis. Operations, March 17, 1921, tracheloplasty, Sturmdorf. March 13, 1922, dilatation and curettage; resection of tube, right; removal of parovarian cyst, right. Date of insufflation September 1, 1921. Maximum pressure 120 mm. Patient was referred to the Obstetrical Department, January 10, 1923, four months pregnant.

5. Mrs. C. S., (Private Case), Age thirty. Married eight years. One full term child delivered by forceps one year after marriage. Complaint, sterility. Laceration of cervix and right adnexal disease. Date of insufflation May 4, 1921. Maximum pressure 178 mm. Patient became pregnant after her next menstrual period and has since been delivered.

6. Mrs. D. S., No. 25965. Age twenty-six. Married eight years. One full term child one year after marriage. Complaints, sterility, backache, leucorrhoea, pain in lower abdomen. Operation June 26, 1920, plastic on cervix and pelvic floor; resection of left tube; separation of adhesions; appendectomy; operation for retroversion (Simpson). Date of insufflation December 21, 1921. Maximum pressure 190 mm. Patient was examined and found five and a half months pregnant on September 20 1922.

7. Mrs. E. C., No. 24683. Age twenty-two. Married six years. One full term child one year after marriage. Complaints, sterility, dysmenorrhoea and backache. Laceration of cervix and bilateral salpingitis. Date of insufflation December 7, 1922. Maximum pressure 160 mm. Operation January 26, 1922, dilatation and curettage. Patient is now eight months pregnant and will be delivered in the hospital this month.

8. Mrs. G. C., (Private Patient). Age twenty-eight years. Married four years. Never pregnant. Insufflation maximum pressure 110 mm. Patient became pregnant two months after insufflation and is to be delivered in the hospital about January 15, 1923.

9. Mrs. L. B., (Private Patient). Age twenty-eight years. Married six months. Never pregnant. Date of insufflation December 17, 1921. Maximum pressure 70 mm. Husband normal. Patient became pregnant one month after insufflation and has since been delivered of twins.

From the histories of these cases it is very difficult to determine whether we can credit the method with any of the pregnancies which have occurred. Certainly the method had a therapeutic value in only a very small percentage of cases.

A study of the Rubin method was undertaken to determine whether it was a safe, practical diagnostic procedure. When patients were being routinely examined with the fluoroscope, fainting occurred in several cases. One patient who was a chronic epileptic developed a seizure of short duration immediately following insufflation. The fact that 600 cases have been examined without any serious casualty proves that the method is reasonably safe. The technic of the test is simple. The discomfort to the patient is not great when the examtion is carefully done.

CONCLUSIONS

1. The Rubin method for the determination of tubal patency is a simple, safe, diagnostic procedure.

2. If details in technic are carefully controlled we can form a definite opinion as to the condition of the tubes in approximately 85 per cent of the cases examined.

3. Patients should not be examined when near a menstrual period or in the presence of acute pelvic inflammatory disease or serious organic heart disease.

4. All cases of sterility, in which a definite diagnosis of the cause cannot be made by bimanual pelvic examination, should be insufflated.

5. Conditions which accompany menstruation, uterine displacements, ovarian and uterine tumors may cause partial or complete tubal obstruction and yet not be apparent to inspection at operation.

6. The method is almost entirely diagnostic. Pregnancy follows insufflation in only a very small percentage of cases.

7. Operative procedures which are done to open tubes or to keep them open in cases where both tubes have been involved in an inflammatory process, fail in a very high percentage of cases.

I wish to acknowledge my indebtedness to Dr. George Gray Ward, Chief Surgeon of the Woman's Hospital, for the opportunity to establish a clinic for the study of these cases.

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(*For discussion, see p.* 112.)

FIBROID TUMORS COMPLICATING PREGNANCY AND THEIR TREATMENT*

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I AM tempted to present my subject to this Society not because I have anything new to offer, but simply to reiterate by a word of caution the need of closer attention to pregnancy associated with fibroid tumors of the uterus. The great variation in the distribution of these tumors, their behavior during pregnancy, the differences in their histologic character and their clinical features before, during, and after labor, have combined to contribute to medical literature a great variety of personal opinions as to the course to be followed. On the one hand we find extreme conservatism combined with a desire to leave the case to Nature's ministrations. On the other, but much less frequently, we meet with a radical trend of thought which advocates removal of the tumor or of the pregnant uterus as the only salvation. Between these two extremes are other views couched in more moderate language. Personally, I must confess a fear in the presence of this condition that has not been alleviated by a consid-

*Read (by invitation) at a meeting of the Philadelphia Obstetrical Society, February 1, 1923.

erable experience. I am frank to confess that the presence of a fibroid tumor associated with pregnancy fills me with doubt and uncertainty until a period of at least three or four months has elapsed after delivery. While it is true that Nature is able in many cases to handle the complication satisfactorily, both from the mechanic or physiologic and histologic standpoint, the uncertainty which attaches to each particular case calls for very careful supervision and a readiness to interfere when the occasion arises.

We may divide fibroids associated with pregnancy into two general classes. In the first, the tumor is myomatous or fibromyomatous, situated in the wall of the uterus and participating in its development with the muscle cells of that organ. No involvement of the endometrial lining need occur in such cases and the presence of the growth in the uterus may merely constitute an obstruction to labor, which is often overcome by the natural forces. In the second group of cases the tumor invades the endometrium with the production of irregular bleeding, or its orderly growth indicates exacerbation with the production of a marked hyperemia in the tumor itself, accompanied by pain; or degeneration takes place in its substance with the production of a possible sepsis, either during pregnancy or after labor. Although such a theoretical classification is possible, the clinical diagnosis is often surrounded with difficulties and an apparently harmless growth during pregnancy may suddenly take on characteristics that endanger the life of the patient. For this reason all such women should be kept under most careful observation during pregnancy, and the occurrence of either pain or hemorrhage should at once call for rest in bed and if possible, sojourn for further observation in a hospital.

Authorities vary as to the pathologic processes which take place in these growths insofar as actual degeneration is concerned, but enough case reports are now on hand with careful histologic examinations, so that we must accept the process of necrosis of fibroids during pregnancy as a possibility. If we can make a diagnosis of degeneration a waiting course is surrounded with danger because of the complications arising from a possible intraperitoneal rupture or an extension of the infection to other places.

It is generally accepted that delivery by the normal forces will occur in the majority of cases and statistics seem to bear out this assumption. Apparently it is only the exceptional instances in which rapid growth of the tumor with possible degeneration, pain, or bleeding, calls for operative interference. Most women with uterine fibroids are said to go through pregnancy without symptoms. Yet from personal observation and experience I feel that interference should not be delayed if pain, bleeding, or fever—either alone or to-

gether—develop at any period of pregnancy and do not subside readily and promptly with rest in bed.

In 1911 R. W. Lobenstine reported a series of 100 cases of fibroid tumors in pregnancy from the Lying-In Hospital service and of these 85 went to term, but 21 required operative delivery. Eliminating 10 low and median forceps deliveries, this left 3 versions, 2 high forceps, 4 cesarean sections and 2 Porro operations. Myomectomy was only done twice in the series; once in a primipara at the fifth month who aborted the next day, and another, also a primipara, at the third month, who delivered herself spontaneously at term. Suppuration in fibroid tumors was diagnosed in 6 cases postpartum with one death, but as there were three other deaths in the series, it is probable that gangrene with extension of the sepsis took place in some if not all of the other cases. During the first four weeks after delivery a complete hysterectomy for sloughing of the myoma was done in 3 cases and vaginal myomectomy in four others; whether operation was done subsequently in the others is not stated. A maternal mortality of 4 cases in 85 in which shock and sepsis were stated to account for death in 3 and intestinal obstruction during the puerperium in the fourth, must be accepted with some hesitancy as a satisfactory result.

Since the compilation of this report the writer has had a personal experience with a considerable number of cases in private and hospital practice and in view of his observations is less inclined to look with equanimity on this complication, although Pinard in 1904 stated that 64 per cent of his cases were delivered spontaneously and Troell reports 68 per cent. F. W. Lynch in a recent text-book on pelvic neoplasms accepts these and other figures as a favorable indication for noninterference. It has seemed to me, however, that the general complacency in the presence of fibroid tumors of the uterus that are associated with pregnancy, is not a favorable or safe attitude for the profession to assume. A mortality of over 4 per cent reported by Lobenstine, and which can probably be duplicated in other series of cases, should not be accepted without comment, especially as the cause of death in each instance was due to sepsis. Myomectomy during pregnancy is usually decried, and Lynch, for example, states that "it appears to him as a surgical curiosity with rather a narrow field for the treatment of fibroids complicating pregnancy, because it is most difficult to perform successfully in the class of cases in which interference is more frequently demanded, namely, pelvic impaction; as well as the fact that subsequent adhesions are almost the rule, and there is the ever present possibility that the scar may rupture during labor in the event that the case escapes abortion and comes to term." I fully agree with him that compelling indications are necessary, but judgment must be exercised in determining when these

indications have reached the limit of tolerance on the part of the patient. It is not possible to state definitely in any one case just when interference should be practiced before term. But if a tumor becomes large enough to cause pain or obstruction, or fever, or bleeding, it should be removed if enucleation is possible, or a hysterectomy should be done. If the pregnancy has advanced sufficiently far to permit of the delivery of a living child by cesarean section or otherwise, this decision should be made before term, because the nutrition of the fetus is often interfered with by placental separation in fibroid uteri. Where the growth is impacted in the pelvis a myomectomy may be difficult, but where the tumor is above the pelvic brim myomectomy can usually be done with good results and abortion avoided by thoroughly narcotizing the patient for several days after delivery.

There is another accident of likely occurrence of which an instance has come to my attention recently, to be detailed further on. I refer to rupture of the lower uterine segment where fibroids are present in this region. It is also possible that many cases of so-called spontaneous rupture of the uterus may have unrecognized fibroids as the basis for the accident.

The recital of certain typical cases of fibroids associated with pregnancy may serve to demonstrate more effectually my contentions as outlined and serve as salient factors in the conclusions which I present.

Pregnancy in a Uterus After Myomectomy, with Subsequent Delivery. Mrs. R. N.—Had an abdominal myomectomy done in November, 1916. She married subsequently and her first baby was born in January, 1919, at the Lying-In Hospital, with a forceps delivery. She apparently made an uninterrupted recovery. Her menstruation was regular, moderate in amount and she became pregnant again the latter part of 1922 and went along without much difficulty except for attacks of left sided pain which were relieved by lying down. No tumor could be palpated. She was more or less asthmatic, however, all through this pregnancy and was finally delivered at the Lying-In Hospital in August without any difficulty. The placenta was not expelled three hours later and as there was more or less bleeding a manual extraction was done. It was found firmly adherent over at least one-half its area to the anterior wall of the uterus, evidently in the region of the scar. The puerperium was marked by a very slow involution of the uterus with considerable bleeding. Her asthma becoming very much worse, the patient failed to report for observation and treatment of her pelvic condition and I did not see her again until January of this year (1923), when she stated that she had menstruated at monthly intervals since the birth of the child but very much more profusely. Her last period began about January 11th and was much more abundant than usual. On the afternoon of January 18th she discharged what she described as a very large, hard, blood clot and experienced severe cramp-like pains in the uterus. When seen by me shortly afterward the patient presented a markedly exsanguinated appearance, with a weak pulse and was in the midst of an asthmatic attack. Examination showed the uterus anteverted, about the size of a three months' pregnancy and hard but with a soft cervix which was sufficiently dilated to admit one and one-half fingers. A considerable mass of broken down tissue, without odor, was removed with the finger and it is very probable that a fibroid tumor had been

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passed. An exploratory curettage was done the next day and the cervix found to have contracted down since the previous examination. The uterine cavity was about five inches deep and at least a tablespoonful of broken down muscle tissue was removed. The patient's blood count before operation showed 3,500,000 red cells with numerous poikilocytes, a color index of 5, hemoglobin content 35 per cent. Preparations for transfusion were made and in view of the patient's asthma, care was taken to guard against any anaphylactic shock. Both the donor and the patient were starved for six hours and about 600 c.c. of blood by the direct syringe method was given. The patient had a moderate chill that night and the following night another chill with severe dyspnea and cyanosis, a weak thready pulse and went into collapse. She recovered within an hour after thorough stimulation but had another attack about a day later, though less severe. The hemorrhage was checked. After this improvement was rapid and an examination on January 29th showed the uterus still about the size of a three months' pregnancy but quite hard, nodular, and the cervix firmly closed.

Comment.—The course of this case shows that a patient with a fibroid uterus should be kept under the closest possible observation even though she has gone through an uneventful pregnancy after a previous myomectomy. The slow involution after the second pregnancy pointed undoubtedly to the presence of other fibroids that were not immediately diagnosed but would undoubtedly have been detected had subsequent examinations of the patient been made.

A similar case with a more satisfactory outcome was that of Mrs. S., a para-ii, who come to me early in her second pregnancy with a fibroid tumor distinctly palpable in the lower uterine segment anteriorly. A steady enlargement of the growth occurred until she went into labor at term, when it was at least six inches in diameter but had been displaced above the brim. Delivery by the natural forces progressed until the head reached the outlet when a low forceps operation was done. At the time of discharge from the hospital, two weeks later, the mass could be distinctly felt in the lower uterine segment but there was no bleeding. During the next two weeks there were slight occasional hemorrhages and a rather foul discharge. When seen about a month later the patient had had a severe chill and examination showed the cervix two fingers, dilated with a rounded mass occupying the lower uterine segment. The patient was kept in bed and given small doses of ergot. Within twenty-four hours strong uterine contractions expelled a tumor as large as an orange into the vagina from which it was manually removed. The patient ran a moderate fever for several days and then involution proceeded quite promptly.

The fact that pregnancy can proceed in a uterus which has been subjected to a myomectomy is well shown by the case of Mrs. N., already detailed and also by that of Mrs. R., a doctor's wife, 31 years of age, who had her first baby after a moderately hard labor, which was terminated by forceps. The child died two weeks later in coma. The puerperium was free from fever but a foul lochia persisted for three weeks and there was considerable sloughing of the perineum. During this pregnancy the patient had a great deal of pain on the left side of the uterus and an attack of influenza with pneumonia developed during the sixth month. There was marked albuminuria. When first seen by me, about ten weeks after her confinement, she presented a subinvoluted uterus with a distinctly palpable fibroid on the left side. The patient was very desirous of having a child but in view of the undoubted fibroid condition of the uterus with its accompanying symptoms, I

advised against her becoming pregnant until after an exploratory reparative operation. This was done in June, 1920. The very much eroded and lacerated cervix was satisfactorily repaired with a Sturmdorf tracheloplasty and a simple Hagar perineorrhaphy was followed by laparotomy. Exploration showed the uterus enlarged to the size of a grapefruit with a soft rounded mass projecting from the fundal region and a much softened cystic mass in the region of the right cornu which extended down between the layers of the broad ligament. An hysterectomy seemed indicated but in view of the patient's age and great desire for offspring, it was deemed advisable to do a less radical operation. Both tubes were normal, likewise the ovaries. The two well marked tumors were then enucleated with considerable difficulty and the patient made a fairly rapid and satisfactory recovery from the operation. The wounds healed by primary union and a later examination showed the uterus freely movable, small, hard, and the subsequent periods although somewhat irregular were much less profuse than formerly. There was no exacerbation of the patient's nephritis as the result of this operation and when seen again in October, 1921, she was pregnant about five months. Aside from some discomfort the patient had a moderately satisfactory pregnancy and went into labor spontaneously January 30, 1922. This was terminated by an easy low forceps. Baby cried vigorously, and weighed over nine pounds. The placenta was expressed by Credê without any subsequent hemorrhages. The uterus involuted very satisfactorily and several months later was found in an anteverted position, freely movable and no evidences of any fibroid tumors present. The cervix did not show any fresh lacerations or erosions. Aside from a slight adnexal tenderness on the left side, the patient was in good condition so far as her pelvis was concerned. The baby unfortunately died when eight weeks old from an intracranial hemorrhage that was apparently of hemophilic origin. The patient was seen again a few weeks ago and is now several months' pregnant. This case shows that even an extensive resection of the uterus with the removal of several fibroids is capable of satisfactorily undergoing the strain of pregnancy and labor.

In contrast to the conservative treatment of the cases noted is that of Mrs. B., a woman 40 years of age, with five living children, who was admitted to the Lying-In Hospital in November, 1922, with a history of irregular bleeding after a period of amenorrhea beginning in August and accompanied by pain and a marked secondary anemia. Examination showed an abdominal tumor extending above the umbilicus, irregular in outline and consistency. The upper part was soft and the patient claimed she felt life. Examination showed a rather emaciated woman, very pale, and bleeding moderately from the cervix. The case seemed to call for radical treatment and after keeping the patient in bed for over a week, an abdominal operation was undertaken. The tumor mass was found to be the size of a seven months' pregnancy, the upper portion being cystic and thinned out with a contained fetus and the pelvis filled up with numerous hard, fibroid masses. A complete hysterectomy was done, which was rendered difficult by the many and large veins in the broad ligaments which gave rise to considerable hemorrhage. The patient made a fairly good recovery and the wound healed by primary union but during the course of the second week she developed a thrombosis in the right leg and a few days later well marked evidences of an infarct pneumonia. From all of this she recovered and when discharged about a month later had improved greatly although she still had some trouble in manipulating her right leg. In this case the woman's age and the situation of the pregnant portion of the uterus above the fibroid mass precluded any palliative operation. Constant bleeding for several months had produced such a marked secondary anemia that no other course could be considered.

That pregnancy may continue to term without interruption after intrapartum

myomectomy is well shown by two cases that I have already reported in a previous communication (New York State Medical Journal, August, 1922). The first of these was Mrs. E., a para-i, admitted to the Lying-In Hospital in August, 1915, seven months pregnant and complaining of marked pain and tenderness in the left side of the abdomen which had been present for several weeks. At various times slight vaginal bleeding was noticed and moderate elevation of temperature was present and the patient seemed very uncomfortable. An exploratory laparotomy was done, based on the probable diagnosis of fibroid tumor with possible degeneration. The round vascular tumor in the region of the left cornu was readily shelled out, it being of the subperitoneal type and the endometrium not being involved. Prompt and satisfactory union occurred and the patient went to term and was subsequently delivered elsewhere without difficulty.

The second case, a Mrs. W., was admitted to the Lying-In Hospital with a history of a five months' pregnancy. She complained of severe abdominal pains and the examination showed an irregularly enlarged uterus, with a tense bulging mass in the culdesac; a moderate elevation of temperature and leucocytosis was present. Exploratory laparotomy based on the probable diagnosis of fibroids complicating pregnancy showed the uterus enlarged to the size of six and one-half months. On the left side anterior to the broad ligament was a firm ovoid tumor attached by a broad base to the uterine wall, the central portion of which was soft and apparently ready to break through the serous covering. This was excised and another tumor as large as the closed fist was found firmly impacted in the pelvic brim. The uterus was entirely delivered out of the abdominal cavity and the tumor excised with difficulty. Another smaller tumor was removed from the anterior surface of the uterus after which the organ was replaced in the abdomen. Notwithstanding the handling to which the uterus had to be subjected, it was not thought advisable to do a hysterectomy, for even if abortion occurred, the patient would still have her uterus for another perhaps more successful gestation later on. The patient made an excellent recovery and went into labor spontaneously at term, delivering herself without any assistance. The uterus involuted satisfactorily and the patient was seen within a few months and found to be in excellent condition—the uterus small and not showing evidences of further fibroid growth. The report of the specimens removed showed necrosis of the central portions of all the tumors and had this patient been allowed to go on she would undoubtedly have developed a serious intra-abdominal condition.

These cases are each examples of the various types of fibroid tumors complicating pregnancy that are commonly met with. Since the publication of Lobenstine's figures, I have gone over another series of histories from the service of the New York Lying-In Hospital in which there were records of 114 cases with fibroid tumors of sufficient size to be noteworthy. These are the histories of 33269 confinements including abortions and postpartum cases of less than ten days, admitted to the In-Door Service from January 1, 1912, to January 1, 1923. In some of these cases the diagnosis of fibroid was not made until after delivery and constituted no obstruction or interference with labor.

My study of these cases is more or less superficial but I shall subject them to closer scrutiny at a later period. The proportion of

fibroids complicating pregnancy noted in the period of eleven years is approximately 0.034 per cent. I was rather surprised to find that the total number of cases with this complication that were entered during the last two years amounted to 38; whereas in the previous eight years there were only 76. Whether this was due to the increased service, or whether more cases of this kind were referred to us, I am not yet prepared to say. Out of the total number there were 51 cases that delivered themselves without operative interference and in the remainder (63), forceps operations were done 13 times (including one high forceps), and version seven times. There were 21 cases in which cesarean sections were done, including four of the number that presented contracted pelves. The operation was combined with myomectomy in 9 instances and a complete hysterectomy was done in one. In this series of cesarean there was one death from postoperative pneumonia. There were two vaginal cesarean sections done with myomectomy, of which one recovered and the other died from shock. Abdominal hysterectomy after labor was done in two cases, and during pregnancy in one. Craniotomy was done twice, in both instances on the after-coming head after version with breech extraction. Induction of abortion was done in two cases, once with a myomectomy. There is also a record of a manual dilatation with version and breech extraction with death of the mother, and another death resulted in a spontaneous delivery from cerebral hemorrhage. This gives us a total of four deaths of mothers which may be attributed to operation.

Certain other facts elicited in this series are of interest. Placenta previa associated with a fibroid uterus was noted in five cases and manual extraction of the placenta was done 11 times. Fever, or a temperature above 100.4 for over twenty-four hours, was present in 21 cases. The condition was associated with toxemia in four instances, one of which was an eclamptic. Displacement of the fetal parts was noted in 17 cases, including three prolapsed cords. There were three instances of twin pregnancy in the series, in one of which delivery was done by cesarean section. Syphilis was diagnosed in four cases. Regarding the babies it is to be noted that there were 23 cases of premature delivery and 15 stillbirths. Abortion (from three to five months) occurred in 11 cases.

It must be admitted that the figures quoted are rather disquieting and are not quite as favorable as those from other clinics in which similar cases were studied.

Guggisberg (*Necrosis of Myomas During Pregnancy, Schweiz. med. Wochenschr., April* 28, 1921, 51, *No.* 17) reported a series of 16 cases occurring in his clinic during a period of eight years from 1912-1920 in which operative interference was found necessary and a total hysterectomy done without a death. In seven necrosis was present.

Heimann (*Monatschr. f. Geb. u. Gyn., May,* 1921), reporting in a clinical article the myoma cases from Küstner's clinic in Breslau during recent years, found a total of 12 cases in which the myoma was of noteworthy size. Abdominal enucleation for symptoms was done six times with four resulting abortions. The expectant treatment was followed in the remaining six cases and four delivered spontaneously. There was no maternal or fetal mortality in this group.

Attention must be called to the fact, however, that many of these women were referred to the Lying-In Hospital by outside physicians because the fibroids were the cause of a dystocia, and undoubtedly the growth of the service in this particular hospital contributed to the increased number.

CONCLUSIONS

(1) The presence of uterine myoma and fibromyoma during pregnancy calls for the most careful observation for evidence of local necrosis and if this is diagnosed by the presence of fever and an increased white-cell count, operation should be considered—either a myomectomy or hysterectomy. (2) Where a tumor is situated in the lower uterine segment and may possibly interfere with delivery, operative interference should be considered if the tumor fails to rise out of the pelvis during the last two weeks before labor, or in the early stages of this process. (3) Exploratory operation is always possible and myomectomy with satisfactory suture of the wound in the uterus may be done without producing abortion if the patient is deeply anesthetized and kept under narcotics for several days after delivery. Even if abortion occurs, the uterus is always left for a possible future pregnancy. (4) If a uterine myoma or fibromyoma undergoes degeneration during the puerperium as evidenced by pain, fever, continuous lochia, either bright or foul, and possibly evidences of peritonitis, an exploratory operation should not long be delayed. It may be possible to enucleate the tumor through the vagina if it presents in the lower uterine segment, or if it shows evidences of spontaneous expulsion this process may be hastened by the administration of ergot at regular intervals. (5) Myomectomy may be undertaken after the birth of one or more children without fear of rupture of the scar in a subsequent pregnancy, provided infection of the scar does not take place. (6) The induction of abortion during the early months of pregnancy should not be regarded with favor, as infection or trauma may damage the tumor tissue to such a degree that convalescence may be markedly protracted and disturbed. It might be better to await the growth of the fetus to viable proportions if no complicating factors appear and then do a cesarean section with or without hysterectomy, or else do a total ablation of the uterus in the early months when symptoms demand the same.

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(*For discussion, see p.* 120.)

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THE PROCESSES OF TUBAL PREGNANCY*

By Ellice McDonald, M.D., Philadelphia, Penn.

(From the Gynecological Pathology Laboratory of the University Hospital.†)

TUBAL pregnancy is commonly understood to be pregnancy within the lumen of the tube, but is really pregnancy outside of the tubal mucosal canal and between the muscular coats of the tube wall.

When the ovum is implanted in the tube, whatever may be the cause, it is deposited upon the mucous membrane, but sinks within the tissues of the tube, so as to embed itself below the mucous membrane, exactly as it does in normal pregnancy in the uterus. The ovum penetrates the surface mucosa and buries itself between the layers of the muscle of the tube. Peters,[1] Opitz[2] and others have shown that this occurs in normal uterine pregnancy and that the ovum embeds itself deep within the uterine mucosa and there develops. In tubal pregnancy a similar process occurs. The ovum embeds itself below the mucosa and between the muscular coats and proceeds to develop there. The ovum has apparently a pseudomalignant property of destruction of tissue, so that it passes through the tubal mucosa by active burrowing action to rest below the mucosa. It is probable that this destructive action of the ovum is due to a proteolytic ferment as the muscle in advance of the actual destruction is altered by swelling, degeneration and breaking down of the fibres, even before the fibres are in contact with Langhans' cells, constituting the deep cellular layer of the chorionic villi. The lumen of the tube is separated from the gestation sac by a well marked muscular and mucosal layer.

The ovum is rarely embedded in a fold of mucous membrane, but must come to lie between two folds (intracolumnar) on the base of the mucous membrane which it very promptly penetrates to reside between the muscular coats. Embedding in a diverticulum of the tubal mucosa has been suggested as a cause of tubal pregnancy, but this is probably only an accident, although undoubted cases have been reported. The burrowing or pseudomalignant property of the ovum is such that it will quickly make a place for itself by penetrating the mucosa, so that such an explanation as embedding in a diverticulum is unnecessary. Embedding in a diverticulum is very difficult of proof because of this penetrating action of the ovum. Unless the scar caused by the penetration of the ovum through the mucosa is found, which would be exceedingly difficult to do, it is hard to see how embedding in a diverticulum could be proved, because the diverticulum itself may be involved in the corroding advance of the trophoblast.

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†I am indebted to Dr. C. C. Norris, Director, for advice and assistance.

The embedding of the ovum below the tubal mucosa has been studied by Futh, Grusdew, Kuhne, Kreisch, Aschoff, Heinsius, Uleska Stroganowa, Kroemer, Fellner, v. Franque and Garkisch and others. It has apparently, however, not been appreciated that the first accident in tubal pregnancy is that of extravasation of blood between the coats of the tube wall and that the first hemorrhage is usually confined within the outer boundaries of the tube itself. The first accident is a hemorrhage at the site of the ovum and is due to the opening of blood vessels by the destructive action of the trophoblast and this hemorrhage further splits the muscular coats of the tube wall and dissects them apart. Apparently this fact has been overlooked except by Bonney and Berkeley in 1905.

A study of a number of my specimens shows that extravasation of

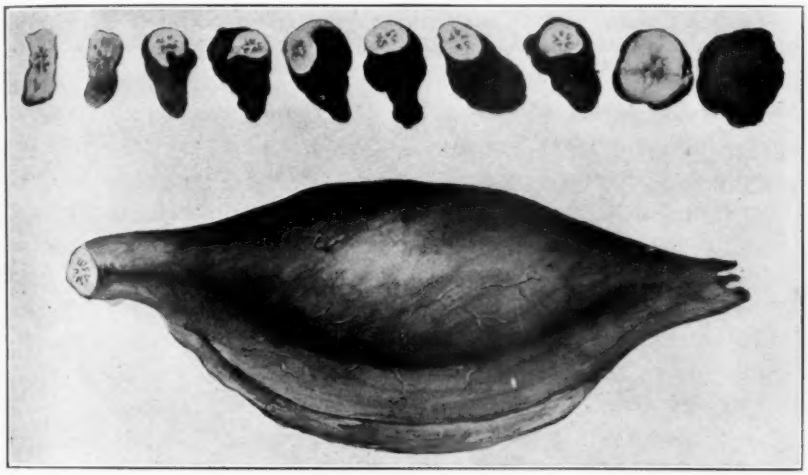

Fig. 1.—Early unruptured tubal pregnancy, showing intramural extravasation as the first accident. Operated upon six days after cessation of the menstruation and one day after the first colicky pains. Cross sections at the top are from the paraffin blocks and correspond to a relative position in the tube. The tube lumen with the circular or ring muscle is seen to be exempt from the hemorrhage. The hemorrhage has not yet ruptured the coats at the fimbrial.

blood within the confines of the tube and between the coats is an almost constant preliminary process in tubal pregnancy, precedes the more dangerous and extensive accidents of tubal abortion and also usually precedes that of tubal rupture. The extravasation may be continued by repeated intramuscular hemorrhages to form a hematoma of the tube where the blood is confined within the outer boundaries of the tube and does not leak on the peritoneum. In these cases, the formation of the blood clot or hematoma is often, and, in fact always at first, outside the tubal mucosal lumen itself. When the tubal lumen is entered, the perforation is by the corroding trophoblast which destroys the limiting mucosal boundary of the lumen, and not by rupture into the lumen, which is usually compressed and collapsed, as is shown in the cross

sections of the early tubal pregnancy (Fig. 1). In this case, the woman had the first symptoms of pain the day before the operation, although she passed her menstrual time by six days. The first pains were colicky and not severe. The intramural extravasation is well shown with the tubal lumen pushed to one side and the lumen everywhere intact. The hemorrhage was seen microscopically to be within the muscular coats of the tube wall and outside the mucosa. The muscular coats were apparently not only separated by the pregnancy, but also by the force of the hemorrhage which found a line of cleavage between the coats already altered by the proteolytic ferment of the ovum. The blood not only occupies the space between the distended and separated coats of muscle, but also occupies the place of muscle that has been destroyed. No blood had passed the fimbrial end of the tube.

Fig. 2.—Microscopic drawing from unruptured case, showing hemorrhage (black) separating the outer longitudinal coat from the inner (right) muscular coat.

The canal, itself, in early tubal pregnancy is usually compressed, as may be seen from the cross sections, which were made from the paraffin blocks. In this case, it would be difficult for this tubal pregnancy to rupture by mechanical force into the collapsed tubal lumen. The tube lumen in tubal pregnancy is not a hollow viscus to be burst into, but it is closed or compressed. In these cross sections, it may be seen that the hemorrhage goes all around the tube lumen without perforating it. When the canal is perforated, it is by destruction of the tube wall from without inwards by the corrosive action of the trophoblast. The dissection apart of the tube walls seems to be due not only to the force of the hemorrhage, but also to the preliminary weakening of the line of cleavage between the muscular coats by actual trophoblastic penetration and, in advance of this, alteration of the muscle by some process,

presumably proteolytic ferment, so that the muscle becomes swollen and glassy. The muscle fibres lose their boundaries and the nuclei disappear. The muscle is prepared for separation and the hemorrhage passes along this altered zone.

In advanced cases, the tube wall itself is destroyed, not ruptured, so that hemorrhage may result into the peritoneal cavity through the tubal ostium. It is quite common, however, that hemorrhage of the type called tubal abortion, may not be through the tubal ostium at all, but the hemorrhage may cause dissection of the tubal walls until it arrives at the fimbria where it ruptures the junction between the muscular coat and the mucous membrane to escape in a break through the tissues on to the peritoneum. Often in these cases careful dissection will show that the remnants of the tubal lumen are outside the blood clot and that the mucosa is distorted and compressed in the walls of he hematoma. This is more frequently seen in the earlier cases, as in the advanced cases the anatomic relations are much distorted.

In the advanced cases the tubal lumen is destroyed by the corrosive action of the trophoblast and lumen itself often incorporated in the walls of the sac. The true pathologic anatomy of tubal pregnancy has been long unrecognized because the hemorrhage, coming from the end of the tube, seemed to come from within the lumen and, in addition, the anatomical relations were so distorted that it is often difficult to find the vestiges of the tubal lumen. However, it may be plainly seen that tubal pregnancy grows first outside of the lumen of the canal, and, if the extension of its process, either of hemorrhage or ovular growth, gets back into the lumen, this must come by penetration of the mucosal layer from without inwards. This penetration inwards when it does occur, is from corrosive action of the trophoblast and the tube canal is merely an incident in its advance. The hemorrhage in every case is due to the action of the trophoblast which actively opens up maternal vessels by destruction of part of their walls.

The site of the ovum, outside the tube lumen in the tubal muscle, cannot be explained except as due to the corroding influence of the trophoblast upon the maternal tissue. The decidual reaction in the tube is meagre in comparison to the decidual reaction in normal uterine tissue. It takes a longer time to occur in the tube and this is accounted for by the different character of the tubal tissues. The decidual reaction with the formation of a layer of large connective tissue-like cells is not, as a rule, sufficient to form a decidual membrane. The whole picture in this specimen and in others of this study of fifteen years, is one of decidual reaction in tissue ill adapted to the purpose.

The hemorrhage in tubal abortion occurs quite frequently after succeeding intramural extravasations have formed a hematoma of the tube. In these cases, it is quite frequently found that the hemorrhage is not directly from the ampular opening, the ostium, of the tube, but

that the dissecting hemorrhage has separated the muscular coats along the length of the tube to the junction of the muscular coats with the mucous membrane at the fimbria. Here it quite frequently ruptures the junction of the mucosa and outer coats at the fimbria to pass out upon the peritoneum through this break and not through the tubal lumen of the mucosa of the canal. This mode of hemorrhage is much more common than is supposed and is overlooked on account of the distortion and destruction of tissue caused by the processes of the tubal gestation. Tubal abortion, so-called, is therefore, frequently not a descriptive term for a condition which is often neither tubal nor an abortion; but it is frequently extracanalicular, both in growth and termination, and is almost always a hemorrhage.

For this reason, the following classification of tubal pregnancy is suggested:—

1. Intramural extravasation, the usual first accident,
2. Fimbrial rupture, (tubal abortion),
3. Transperitoneal rupture, (tubal rupture).

In suggesting a new classification, it is realized that the old terms are too well entrenched in the minds of surgeons and in the literature to expect that they will be removed. However, it is hoped that this new terminology will be more descriptive of the pathologic processes involved in tubal pregnancy and will cause a more exact and searching study of their terminations. The fimbrial rupture may be through the ostium or through a break in the tissues at the ostium and outside the mucosal orifice.

In transperitoneal rupture, tubal rupture, the period of intramural extravasation is slight or missing. Those cases in which it is small are, no doubt, the severe cases of profuse intraperitoneal hemorrhage without preliminary symptoms. In a study of 1098 case reports in series, it was found that where a distinction was made as to mortality between tubal rupture and tubal abortion, the mortality after rupture was 17 per cent, while the mortality after tubal abortion was 1.6 per cent. Thus the mortality was eleven times greater after rupture than it was after abortion. In 6626 cases, all taken in series and not individual cases, the total mortality after operation upon all forms of tubal pregnancy, was 7.04 per cent. In 2909 cases, in which the location of the ovum was noted, it was said to be in the outer third or ampullary end of the tube in 75 per cent of cases, in the middle third in 15 per cent and in the uterine end infrequently. Thus, one-third of all the cases of tubal pregnancy had a mortality eleven times greater than the remaining two-thirds. This includes only cases after operation and does not include the deaths, occurring before operation, which must be due to the more fatal type of the disease, tubal rupture.

The usual course of tubal pregnancy is intramuscular embedding of

the ovum with dissection of the muscular coats of the tube and destruction of the tissue by the invading trophoblast. The first common accident is intramural extravasation of blood which precedes the first symptoms of tubal pregnancy. There follows in two-thirds of the cases, fimbrial rupture or less commonly transperitoneal rupture in one-third of the cases. Fimbrial rupture quite often occurs through dissection of the muscular coats to their junction with the mucosa at the fimbria and hemorrhage discharges at the end of the tube through a break in the tissue. In other cases, the tube lumen is destroyed by the corrosion of the invading trophoblast, so that the mucosa and its boundaries are penetrated and the hemorrhage passes through the mucosal orifice at the ostium. Tubal hematoma quite frequently forms outside the tube lumen and within the muscular coats of the tube, although the canal may be destroyed by the invading trophoblast and be incorporated into the hematoma. Intramural extravasation usually causes death of the fetus. Transperitoneal rupture may, indeed, occur as a first accident and not be preceded by intramural extravasation, or else be very closely followed by rupture in those cases of sudden symptoms and severe hemorrhage.

Intramural extravasation is the cause of the first pain in tubal pregnancy, the milder colicky pains which precede the severe pains of the passage of blood into the peritoneal cavity. Hemorrhage from the uterus occurs first at the time of intramural extravasation.

The fimbria of the tube with the distention which occurs in tubal pregnancy is very commonly retracted or engulfed within the tube on account of the stretching of the outer muscular coat and the firmness of the mucosa and the inner coat. This is one reason that the anatomic relations of tubal rupture are not commonly recognized.

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UTERINE CARCINOMA AND ITS TREATMENT BY CONTINUOUS LOW HEAT*

A Preliminary Report

By James F. Percy, M.D., Los Angeles, California

CARCINOMA is more vulnerable to the application of heat than to any other known agent that has so far been employed for its destruction. The difficulty is that we have not been wise in observing Nature's method of destroying the occasional case of cancer through the instrumentality of heat. Had we done so we would have learned that a low temperature persisting for days or weeks was successfully used in the natural cure of some of these patients. But no one has ever tried, except in a very crude way, to learn how to favorably duplicate these original or natural methods for the cure of this disease. Heat in the treatment of malignancy probably started its progress with the development of the human race and of all the methods that have been urged to take its place it alone still retains its ancient and beneficent repute and character.

Rohdenburg[1] in a most illuminating and instructive article on one of the little discussed phases of the cancer question says on the subject of heat in its treatment: "It appears that the most efficacious of all the many conditions which can bring about regressive change (in cancer) is heat, applied from without or occurring under the limited conditions of long duration and comparatively low degree." Our difficulty with heat in the treatment of cancer has always been the one of not knowing how most effectively to get the maximum benefits from its employment.

There are two extremely practical factors which are commonly overlooked in our attempts to control cancer. One, heat, has just been mentioned. The other is our failure to recognize that the gross appearance of a malignant mass gives no clue as to what it will finally do to the individual possessing it. The more innocent many of these growths appear to be the greater their potential malignancy often is, while an overgrown, vicious, suppurating, painful mass may on treatment prove to be extremely benign. We have no assured means then of determining, either from the clinical or from the laboratory side even the approximate virulence of a mass of cancer. This makes it also quite certain that we have no method on which we can base an intelligent prognosis from the physical appearance

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of a given growth regardless, I repeat, of how benign or how frightful it may appear *in situ*. Many of the cases submitted to my technic have been, from our usual point of view on the prognosis of cancer, not only inoperable, but also utterly hopeless from the treatment standpoint. Yet many of these otherwise doomed cases are alive and well years after the application of the heat when it was used primarily only as a palliative. Indeed, it was at that time assumed that this was the only possible benefit that the heat application could give. Consequently we have no means of knowing, either the characteristics or the percentage of these usually fatal (if untreated) cancers, in which natural processes can, by rational management, be greatly aided to bring about an intermission, a remission or a complete postponement of the activity of the growth. We are, therefore, not justified in considering any case of accessible cancer inoperable by the heat method no matter how extensive the growth locally. The only possible exception to this is an inaccessible metastasis combined with remediless infective changes in one or more vital organs, such as the kidney or heart, and which make the outlook for the patient, if not hopeless, exceedingly grave.

Heat is a primary and fundamentally selective antagonist of the cancer cell. Radium, x-ray, d'Arsonval current and heat all have a selective action for neoplastic cells, and when they are exposed to a sufficient extent to any of these agents, are destroyed. The degree necessary for destruction of a new growth by any one of the first three, however, more nearly approaches the lethal point of healthy cells and consequently adjacent normal tissue is injured to a much greater extent than when heat alone is used. Furthermore, the penetration of heat is a rather slow process. It is disseminated by conduction rather than by radiation and is therefore absolutely controllable. This, coupled with the fact that the thermal death points of normal and malignant cells are much farther separated than is the mortality of these cells from the other three agents, makes heat the logical method of choice. Increase in temperature both local and general (acceleration of physiologic processes) is Nature's way of combating practically all pathologic invasions of poisonous substances (bacterial, proteid, etc.). Heat is involved in the reaction to disease, and it is one of the four fundamental processes of repair which have been recognized from immemorial times.[2] This fact alone is sufficient to explain the wide variation of the thermal death points between the normal and abnormal cells in their reaction to heat. I have also pointed out that this repair in the adjacent cells following the use of the heat in destroying a malignant tumor follows the normal type much more closely than is ever true after the use of radio-active substances or high frequency currents, and therefore in-

terferes with the normal anatomy and physiology of the part or parts in the least possible degree.

In our day the treatment of cancer has assumed new interest from the use of radium, the d'Arsonval current, and the x-ray, especially with the modern deep therapy apparatus. It is not my purpose to discuss any of these methods except incidentally. I welcome them as an excellent indication of the more rapid approach of the time when the medical profession will know what is really best and most promising in the treatment of this increasing menace to the race. That all methods in addition to heat have a place in the management of a selected minority of these patients cannot be questioned. But I also know that the greater number of sufferers will receive a larger measure of benefit from the heat treatment of their operable and inoperable growths as it can be applied today than will ever be possible from any of the so far discovered radio-active agents or high frequency currents. The mystery of radium and the secret of the unknown quantity of light which has been labeled the x-ray are no more of an enigma than is heat. It is merely another of the unexplained mysteries of our existence. Indeed, in some respects we know less about it than we know of either radium, the x-ray or the high frequency current. Heat is known as a great force in physical nature, and it is harnessed and made to perform many services to mankind. Like all the great compelling powers of creation it is invisible, except through its effects and it defies analysis. It has no weight, no dimensions, no substance. It is synonymous with sunlight, and can be produced by fire, electricity, friction or chemical action. Its destructive possibilities are legion, and not the least of these is its power for good when regulated and applied to abnormal human tissues. It will probably never be better known to man than as one of the great correlated forces. Can any of us fathom what would have been saved the members of the human family, when suffering from cancer, had it been the rule to apply a piece of hot iron to every abnormal growth while it was still a small affair? The chance that heat may, in the near future, be the solution of the question of the successful treatment of all forms of cancer is not sufficiently appreciated by surgeons.

There are two methods by which heat may be applied to cancer invaded tissues. One where it is disseminated continuously for at least an hour in cavity carcinoma; the temperature ranging from 204.5° C. to 260° C. (400° F. to 500° F.); or by the employment of a hot knife in dissecting out a localized malignant mass. These are the more familiar procedures with the cautery and are the basis for whatever recognition it has received in the past in the treatment of this variable disease.

The second method for making use of heat in the treatment of

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cancer is an outgrowth of the work done on the malignant tumors of animals in the experimental laboratory. With these should be noted the cases where there has been a total disappearance of malignant growths in the human subject from diverse methods of treatment. A most interesting fact from a study of these cures is that it will be found that the method used initiated some form of irritation in the growth which seemed to cause it to slowly melt and waste away. One of these is mentioned by Rohdenburg. A woman suffering from a typical spindle-celled sarcoma of the pelvis was treated for rheumatic-like pains attributed to the growth by exposing the entire body in a continuous light bath (baking), with the hope of relieving her pain. Thirty treatments in all were given. To the surprise of everyone, instead of growing progressively worse, as she had been doing, the patient slowly improved until her health was completely restored two years after the operation. The pelvic mass also disappeared. This is not an isolated instance. To those who are especially interested I would recommend the articles by Gaylord and Clowes[3] and also that by Lomer[4] (quoted by Rohdenburg). This last investigator has collected a series of 213 cases of recession of malignant growths, occurring chiefly after the application of the cautery. These articles are intensely interesting and well worth study. But I do not want at this time to relate cases except as they may be necessary to make more clear the principle that I am trying to reveal. This is that cancer abhors heat. But we have not sufficiently appraised the immense possibilities in this great fact, at least to the extent where we have attempted to apply it practically in the treatment of the disease. I want to emphasize that I am not now discussing the comparatively brief application of high heat as applied by the cautery, but the continuous use (days and weeks) of a low temperature artificially produced in a mass of accessible carcinoma either in one of the cavities of the body or on its surface; thus applying, at will, to external malignant growths and to accessible cavity carcinoma the same methods which a continuous fever sometimes produces unbidden in the subject of cancer. The difference between this second method where the heat is applied externally and the spontaneous cures of malignancy by natural methods is that in the latter the temperature of the blood is raised by the acquired infection and this heated blood destroys the abnormal cells.

In the second method, which we are discussing, the heat is diffused from a diminutive metal thermogenic tube and acts directly on the enfeebled cells. This heating unit is the outgrowth of a cruder instrument[5] which I had made in 1916 after learning of the experiences of Wassermann and Delbet following the subjection of laboratory animals to a continuous external low temperature—40.56° C.

(105° F.), with the result that not only did their cancerous growths not develop but they gradually receded and disappeared.

My first instrument was the outgrowth of many attempts to find a satisfactory method for applying a low temperature practically continuously in cavity carcinoma without the intervention of an anesthetic local or general (Fig. 1). With this instrument I have seen, in a few cases, a vaginal tube which was packed with cancer freed of the disease in a few weeks. I mean by this that there was no further ocular or digital evidence that a malignant mass was or ever had been in that particular anatomical location. The first temperature of the heating iron was set at 48.89° C. (120° F.). With the

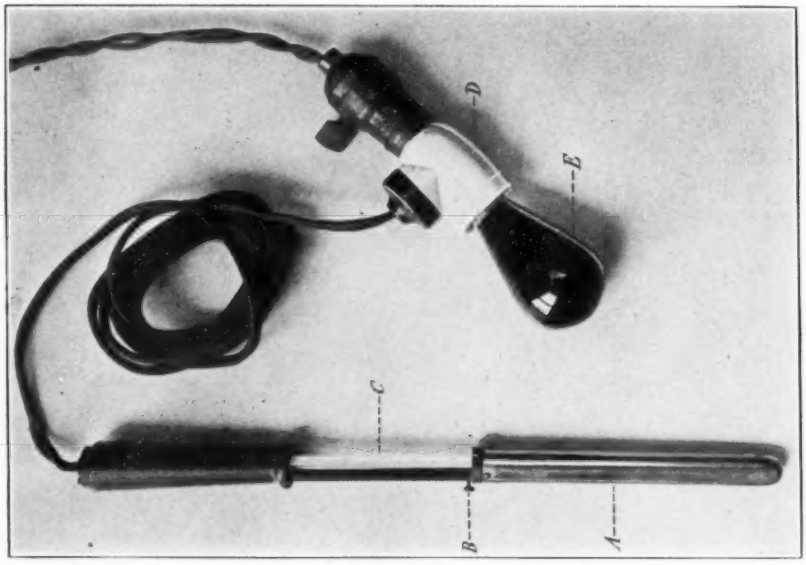

Fig. 1.—Showing a current-tap (*D*) which can be inserted in any electric lamp socket of 110 volts, on either a direct or alternating current. A carbon lamp (*E*) of half ampere with a deep blue glass globe is part of the outfit. The intense color of the globe protects the patient from the disturbance that would otherwise come from its flashing on at night, as it would when the current automatically turns away from the heating iron into the electric bulb. The degree of heat is regulated by a small set screw (*B*). The temperature while the instrument is in use is shown by the thermometer (*C*). The heat is maintained automatically in the heating iron (*A*) at the required temperature, through the series current-tap.

patient in bed this degree of heat was maintained for eighteen hours. Five degrees was added at each additional eighteen hour period until the thermometer registered 71.11° C. (160° F.). This last was continued for several weeks—in one case for six weeks. Further experience I believe will show that a temperature of 60° C. (140° F.) applied for a shorter time will accomplish all that the higher temperature and the longer period will; the explanation being that the heat in a cavity will accumulate when confined and will steadily rise even though the heating tube starts with an initial temperature

of but 60° C. (140° F.). Another important factor is the one that normal, living human tissues rapidly acquire a remarkable immunity to increasing therapeutic degrees of heat. This appears never to be true of the low grade cell. Indeed, Loeb has shown that even partial injury to a malignant cell by heat is transmitted through several subsequent cell generations.

This first instrument (Fig. 1), however, proved to be impracticable in that its mechanism was too easily put out of commission especially in hospital work. It was also larger than was necessary and consequently heavy and unwieldy. But in the few cases in which it was employed it demonstrated remarkable destructive effects on the cancer cell in the invaded tissues with a minimal degree of injury to the normal structures. I then contrived the instrument which is shown in Fig. 2. Aside from the heat controller which can be plugged

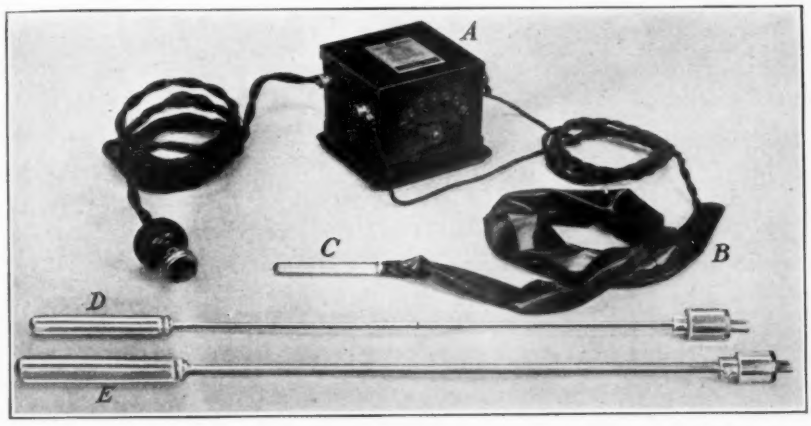

Fig. 2.—*A*, Transformer or heat controller; *B*, cigarette drain to protect lead cords from secretions; *C*, small thermogenic tube; *D* and *E*, medium and large thermogenic tube.

into any lighting system of 110 volts alternating current the thermogenic tube (C) is the essential part of the device. It consists of a small metal sealed tube containing a heating element activated by electricity. This latter agent in no way comes in contact with or acts upon the tissues. The effective curative agent in the tube is merely and alone simple heat.

This tube, in the treatment of cancer, can be introduced into a cavity containing the disease or into a malignant mass in the same way as radium is now employed. The tube of heat, however, will have the advantage of avoiding the present destructive effects on normal structures peculiar to or characteristic of the uncontrolled penetration of radium and of the x-ray. In carcinoma either in mass or in a cavity this heater can be so regulated as to supply a degree of low heat sufficient only to penetrate the involved tissues the neces-

sary distance. As will readily be understood this at once removes an objection to the cautery where the high heat of that instrument was, to many surgeons, a barrier to its most effective use. It will also tend to turn the minds of physicians in general away from the unfortunate and erroneous idea that the cautery is in some way the essential element in the success of this method in curing cancer. The mere use of the word cautery has caused many surgeons to overlook the fact that the effects produced in cancer are derived from and are dependent upon the thoroughness of the diffusion of the element heat from the heating iron uninfluenced by an extraneous agent. I trust, however, that I shall not be misunderstood. This therapeutic thermic applicator is not offered with the idea that it will supersede the use of the knife cautery. It can never entirely do that. In patients suffering from an external malignant growth, especially if it is suppurating, the hot knife will still be found to be the most satisfactory method yet offered for its safe removal.

The purpose of this paper then is to make a preliminary report on the value of the prolonged use of a low degree of heat in the treatment of cancer in the class of cases in which it can be made applicable. One of these is the vagina, cervix, utero-cervical junction and body of the uterus. In the majority of instances where this simple apparatus is used the heat is easily regulated and controlled so as to be destructive only in a minimum degree to normal tissues acting in the greatest measure as a destroyer of the cells of cancer in any portion of the birth tract. An additional benefit is the one of practical freedom from danger and as well simplicity and comparative cheapness of the required apparatus.

There is only one caution that I want to emphasize in the use of this heater. Don't shove it into a mass of cancer. Force or roughness or any kind of movement or manipulation has no place in the treatment of this disease. If it cannot be deposited in a mass or cancer filled cavity without the slightest traumatism, the cautery knife should be used to make a pocket into which it can be easily introduced.

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HEMORRHAGES IN THE NEWBORN*

By Lucius A. Wing, M.D., New York City

WITHIN the past decade, the closer study and observation of the newborn infant revealed a greater incidence of abnormal conditions than was formerly recorded. Aside from anomalies of development, these conditions are chiefly traumatic in origin, and their subsequent course is dependent upon the degree and character of the injury, upon the vitality and adaptability of the individual infant, and upon early recognition and treatment in certain cases.

Of conditions affecting the newborn intracranial lesions associated with hemorrhage are of great importance, not only because of their frequency and high mortality, but on account of the permanent damage which results in many of the survivors.

Kearney, in a recent report of the examination in New York of 480 children with cerebral spastic paralysis, with or without mental deficiency, states that intracranial hemorrhage at birth is responsible, pathologically, for 70 per cent of the spastic type of paralysis in children, and for 20 per cent of the idiocy and feeblemindedness now existing.

He observes that, with a knowledge of these statistics, it is a prime consideration in present day obstetrics that every means be employed to minimize the chance of injury to the infant's cranium and its contents.

As has been ably pointed out by Ehrenfest, the frequency of fatal intracranial lesions is far greater than even recent infant mortality records would indicate. Many infant deaths, ascribed to asphyxia, are in reality due to intracranial or other injuries, the exact character of which can only be determined by a properly performed autopsy. It should be emphasized that fatal intracranial hemorrhage may occur in an infant born spontaneously, in what is considered a normal labor.

According to time of onset, hemorrhages in the newborn may be divided into two main groups: first, those occurring during or immediately after birth; and secondly, those occurring or manifesting symptoms after a period of some hours or days.

1. We may first consider the cases of intracranial trauma with gross hemorrhage.

Various observers report more or less extensive subdural intra-

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cranial hemorrhage in from one-third to one-half of the autopsies upon stillborn infants, and in those dying in the first few days of life. In addition to hemorrhage, other traumatic effects are frequently present in cases of this type.

In 59 fatal cases of intracranial hemorrhage, 20 of which were breech and 39 vertex cases, Browne observed tearing of the tentorium cerebelli in 37 per cent, 63 per cent of which were in breech deliveries.

Losee has tabulated the location and extent of the hemorrhage found at autopsy at the New York Lying-In, in a recent series of 69 cases of intracranial hemorrhage, as follows:

Over both hemispheres,	10 cases
Over one hemisphere, and beneath the tentorium,	12 cases
Bilateral and beneath the tentorium,	16 cases
Bilateral, beneath the tentorium, and in the ventricles,	23 cases
Beneath the tentorium and in the ventricles,	7 cases
Epidural	1 case

The same observer, in autopsies over a period of ten years at the Lying-In Hospital, has observed fatal intracranial hemorrhage twice as frequently in breech extractions as in forceps operations.

Intracranial hemorrhage, occurring during and immediately after birth, may be due to the direct tearing of blood vessels in various regions, or to the rupture of thin-walled vessels by increased pressure from within.

Death, if it ensues, is due to compression of the medulla through general increase in intracranial pressure, or to more localized pressure, if the hemorrhage is beneath the tentorium.

Nature has admirably protected the infant's delicate cranial contents from the traumatic effects of the forces of labor, provided the normal vertex mechanism prevails, and there is no disproportion.

With proper engagement and progress of the head, the forcible contractions and thrust of the uterus are balanced, so far as the infant's head is concerned, by the firm support of the birth passages.

By virtue of this support of the maternal tissues, increased intracranial pressure and disruptive intracranial effects are minimized, as the cranial contents are largely fluid and noncompressible.

It follows, as a matter of mechanics, supported by clinical observation, that more intracranial injury may result in a few moments during a hasty or unskillful forceps operation, or similar attempt to extract an aftercoming head, than may result from some hours of strenuous labor with normal vertex engagement.

The hemorrhage following difficulty in the extraction of the aftercoming head is usually in a dangerous location, being most frequently found beneath the tentorium, or in the region of the medulla, and often associated with tears of the tentorium.

Babies with subtentorial hemorrhage are frequently stillborn. If respiration can be established, the infant may survive, but death in from a few hours to several days is most often observed. The clinical appearance of these infants is most typical; they are limp, have a squeaky, high-pitched cry, the respiration is irregular, and they often show alternating periods of pallor and cyanosis.

Intracranial hemorrhage following vertex cases is more often observed over the cortex, due to rupture of the cortical veins; the prognosis in these cases is usually better. In the more severe types, however, the hemorrhage is often bilateral, within the ventricles, and more or less diffuse within the cranial cavity, and the course is similar to the preceding subtentorial type, through compression of the medulla.

It is not within the scope of this paper to discuss in detail the diagnosis, prognosis or treatment of these severe types of intracranial trauma. In general it may be stated that in the more extensive lesions, the infant is either stillborn or dies shortly after birth.

Intracranial lesions of greater or lesser degree, may be suspected in all babies showing asphyxia at birth, in whom resuscitation is difficult, or when prolonged efforts are necessary to establish respiration, and particularly when the latter shows irregularities after establishment.

It may be emphasized at this point, that only the gentlest manipulations are permissible in attempting to establish respiration.

The prognosis, both as to life and future health, in babies with intracranial trauma, depends on the anatomic location and the extent of the ensuing hemorrhage.

The treatment of these infants may be considered in the prophylactic sense, by avoidance where possible of sudden or severe pressure on the child's head through any agency or procedure.

Surgical treatment by decompression, relief of intracranial hypertension by lumbar puncture, and the administration of blood or serum where hemorrhagic tendency exists, are modes of treatment applicable to suitable cases.

2. Asphyxia, without gross intracranial hemorrhage, is recorded by various observers, in about one-half of the stillborn. In this group of infants, Losee and others have observed quite constantly the presence of capillary hemorrhages in various localities, chiefly over the cerebral cortex, the epicardium, the capsule of the liver, the pleura, the retina and beneath the conjunctiva. Many babies survive and do well, who have shown at birth marked asphyxiation with delayed establishment of respiration, and it may be presumed that capillary hemorrhages occur in many of the survivors.

Should these infants develop an early blood instability, it is probable that fresh bleeding occurs in some areas where capillary hemorrhage has previously taken place.

Although it has not been demonstrated that asphyxia alone has a marked influence on the development of hemorrhagic tendency, yet it would seem wise to regard infants in this group as potential bleeders, and to keep them under very close observation. Frequent observations on bleeding and clotting time should be made upon infants of this type during the first week after birth.

Recently we have determined the bleeding and clotting time by the Rodda method in a series of twenty-five infants, delivered by some operative procedure after abnormal labors in which were observed disturbed fetal heart action, the passage of meconium, or other evidences of fetal distress. No infants were included in this series which showed definite intracranial injury at birth, but all showed a greater or lesser degree of asphyxia, with some delay in establishing respiration.

Bleeding and clotting time determinations were made by the Rodda method on each of the twenty-five infants on the first, third, fifth, seventh, and ninth days postpartum. At some period during the examination the coagulation time was found delayed in seven cases, it was found normal at each examination in the remaining eighteen cases. The bleeding time was found normal at each examination in twenty-four cases. In one case the bleeding time was found prolonged on the third day, but became normal again on the fifth day, and this infant presented no clinical symptoms of hemorrhagic disease at any time. All the infants in this series were discharged from the hospital in good condition. It may be noted that seven of the twenty-five infants showed a transient delay in coagulation time, a higher ratio than is usually observed in normal infants.

3. Hemorrhages developing in the newborn some hours or days after birth, are usually associated with hemorrhagic diathesis.

Autopsies upon cases of this type, in which death was due to intracranial hemorrhage, will usually show hemorrhage in other parts of the body, particularly in the lungs and in various abdominal organs, especially the suprarenals.

Rodda and others have shown that the normal newborn infant, exhibits a progressive lengthening of bleeding and clotting time during the first few days after birth, reaching its maximum on the fourth to the sixth day, and returning to normal from the eighth to the tenth day postpartum.

The normal clotting mechanism of the blood is a somewhat complex phenomenon, and the etiology and pathology of hemorrhagic disease of the newborn are not definitely understood. It is a well-established

clinical observation, however, that a certain number of newborn infants fail during the first few days of life to maintain a proper stability of the blood. I believe that we have evidence that parturitional trauma and exhaustion have a decided bearing upon this loss of blood stability. Losee and the writer have observed a number of these infants at the Lying-In Hospital, and have been impressed with the abruptness with which symptoms may develop in an infant whose previous condition had seemed quite good. A certain number of infants in this group are born following normal labor, a certain number are premature, but the majority, in our observations, have been babies born after long hard labors, or operative deliveries. We have come to regard all such infants as potential bleeders and to observe them very closely for the sudden development of intracranial hemorrhage. Symptoms most often develop in the third, fourth or fifth day postpartum, and in the first few hours are not always clearly indicative of an intracranial lesion.

Among the earlier symptoms observed are loss of eagerness or of ability to nurse, listlessness and pallor. A little later the cry becomes higher pitched, the infant shows some spasticity and often slight retraction of the neck. The anterior fontanelle usually shows increased tension. Nystagmus is often seen and also changes in the fundus.

Later, convulsions and respiratory symptoms develop if the hemorrhagic area increases, and death ensues through paralysis of respiration.

Delayed bleeding and clotting time will be observed in these infants, usually from the onset of clinical symptoms. In some of the infants, however, bleeding and clotting time changes did not appear until after definite clinical symptoms were present to a marked degree.

Early recognition and treatment before the more serious symptoms develop is very important in these cases, and treatment should not be delayed in cases where blood changes are indefinite by laboratory test. At the Lying-In Hospital, the subcutaneous injection of human serum, as a therapeutic measure, has proved very effective, if given early. The usual dosage is 100 c.c. in the first twenty-four hours, divided into three or four doses, injected subcutaneously in the dorsal region at intervals of four to six hours. During the second twenty-four hours, fifty to sixty c.c. of serum are given in the same way, if it seems advisable.

Whole blood may be used instead of serum with equally good result, but whole blood is not absorbed as rapidly as serum and is more prone to cause irritation at the site of injection. Outside of hospitals, the administration of whole blood is preferable, on account of simplicity of technic.

The improvement in general condition and the abatement of cerebral symptoms following the administration of serum is often very rapid and satisfactory, if the serum is given early. No typing is necessary for the subcutaneous administration of blood or serum, and we have observed no unfavorable reactions following their use.

4. A certain number of newborn infants develop hemorrhagic disease of the type which has been recognized clinically for a considerable period. These cases are characterized by the development within the first few days after birth of hemorrhages beneath the skin, bleeding from the mucous membranes, the cord and elsewhere. Intracranial bleeding may or may not occur, and these cases if untreated, die from the general loss of blood, rather than an intracranial lesion. Birth trauma and prematurity appear to have an influence upon the development of this condition. These infants show marked lengthening of the bleeding time and delayed clotting time of the blood.

In a series of 21 cases of hemorrhagic disease of the newborn observed at the Lying-In Hospital by Losee and the writer, 11 cases were operative deliveries, as follows: Six forceps applications, one breech extraction with dry labor in an elderly primipara, and four internal podalic versions and breech extractions, three for pelvic deformities and one for prolapsed cord. In several of the remaining ten cases, the mothers had long hard labors, but were delivered spontaneously. These twenty-one cases were all of the typical well pronounced type of the disease, and were treated by blood transfusion or the subcutaneous injection of human serum. One baby in the series died of cerebral hemorrhage and anemia, the others completely recovered. Twelve of these babies have been followed for a year or longer, these have developed normally and have shown no recurrence of bleeding tendency. Transfusion, with either unmodified or citrated blood, controls the bleeding tendency more rapidly than the subcutaneous injection of whole blood or serum, and restores the blood already lost by the infant but necessitates some delay for typing and preparation.

In concluding these observations on the subject of hemorrhages in the newborn, the following points may be emphasized.

1. Hemorrhages developing in the infant during birth or shortly after, are of greater frequency than was formerly believed; they often occur in babies born spontaneously.

2. Sudden or severe compression of the child's head, either by the natural forces of labor or by some obstetrical procedure, is the chief mechanical cause of intracranial lesions.

Asphyxia of the infant during birth has an influence on the stability of the blood and impairs the clotting power. This renders these in-

fants especially susceptible to both immediate and delayed hemorrhagic lesions.

3. Therapeutic measures, to be effective in these cases, should be employed early in their development; the attending obstetrician should thoroughly appreciate his responsibility for the early recognition of hemorrhagic conditions in the newborn.

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Society Transactions

TRANSACTIONS OF THE AMERICAN ASSOCIATION OF OBSTETRICIANS, GYNECOLOGISTS AND ABDOMINAL SURGEONS

THIRTY-FIFTH ANNUAL MEETING

ALBANY, NEW YORK, SEPTEMBER 19-21, 1922

(Continued from June issue)

DR. JAMES F. PERCY, LOS ANGELES, CAL., presented a paper entitled **Uterine Carcinoma and Its Treatment by Continuous Low Heat.** (For original article see page 78.)

DISCUSSION

DR. AARON B. MILLER, SYRACUSE, NEW YORK.—Several years ago, I attended one of the western meetings, when Dr. Percy demonstrated his method of operating with the cautery. I was much impressed with his enthusiasm, but I left the meeting and came home with the feeling that I did not care to be treated in that way, nor so to treat my friends. One of our Rochester associates was so enthusiastic that he brought home the apparatus, and I said to him, "According to the theory which Dr. Percy has presented and the demonstration which we have witnessed, I shall send to you all the bad cases of cancer, because I do not want to have the people in Central New York following me around, with discharges of the rectum and bladder coming through the vagina. Dr. Percy has made an impression with what he has shown us today, for I believe it has much merit, and that his improved mechanical device is a marked advance in our armamentarium in treating malignancy of the womb."

"One swallow does not make a summer," but there was an instance where I was thoroughly impressed, and am at the present time, that heat *did* bring about the recovery of a case of cancer. Near our city, a woman with advanced cancer of the cervix was cared for by an able surgeon, and feeling it was an inoperable case, the only thing that could be done would be to afford her relief. He burned out the tissue of the cervix and into the fundus with the actual cautery.

Several months after this, I was asked to see the patient at her home. My opinion was that she could not live long (and I had all confidence in the diagnostic and surgical ability of her physician) which opinion was confirmed by my examination. I found her pelvis filled with an exudate, and concluded this was an extension of the malignancy. It conformed to the condition we recognized forty years ago as pelvic cellulitis, a good enough name at that time, as we did not know better. So I told her people there was no question but that the prognosis was very bad. She was not sufficiently ill to be confined to her bed and kept there, and it was thought better to get her out in the air, bring her to the city and have her treated by a radium specialist.

Accordingly, she was brought to the city and received radium.

I did not hear anything from her for a long time, but two years ago, on returning from the meeting of this Association, I found her at my office with the physician who had called me to see her in consultation. I was a little amazed. I wondered how she could have been brought back from the grave.

Physical examination revealed the pelvis absolutely free from any disease, only the absence of the cervix, the exudate had passed away, and she seemed to be in a normal condition.

The radiologist takes the credit of having cured her. There is no question in my mind but what it was the cautery action which brought about this cure.

DR. G. VAN AMBER BROWN, DETROIT, MICHIGAN.—Five years ago next December I first began to follow Dr. Percy in his treatment of carcinoma of the cervix by heat. Since then I have operated upon 14 patients, combining with the use of heat, ligation of the internal iliacs and ovarians, in some cases dissecting out the postperitoneal lymphatic glands. Of those 14 cases, two died immediately following operation. One of these was moribund when she went to the operating room. In another, cancer was complicated with fibroids and pyosalpinx. She died from a peritonitis eight days after operation. Of the other 12 cases, there are four that have shown a recurrence; two died early; the third one I operated on five years ago next January and she died the first day of June this year, but whether of carcinomatosis or not, I have not learned. The fourth is still living with a recurrence of very slow growth. So that of the 14 cases eight are today, symptomatically at least, perfectly well.

You may remember the case of a young woman, 27 years of age, which I reported last year, an advanced case in which we used heat with ligation. She refused to have anything further done. That woman menstruates three days in the month, and only two days before I came here her husband reported that she was enjoying the best of health. I have not examined her for ninety days.

In connection with this work, I desire to call your attention to the behavior of cancer cells which are within the walls of the three coated blood vessels. These cells are less vulnerable to the effects of heat than those not so situated. It occurred to me that the reason for this is—that just as the water circulating in the water jacket of an automobile has a cooling effect on adjoining structures, so the blood circulating in these larger blood vessels has a cooling effect on their walls, thus preventing, when heat therapy is employed, the destructive effect on the cancer cells growing within these walls. So if in the treatment of carcinoma of the cervix the use of the starvation ligature is resorted to, thus checking the blood stream, these cells within the walls of the larger blood vessels will be rendered as vulnerable to heat as are cancer cells outside blood vessel walls.

I would like to ask Dr. Percy a question. He spoke of applying the cautery to masses of macerated tissue by forcing the instrument into the mass. If we so employ the cautery, is not a carbon core produced, and if so, it would prevent the dissemination of heat, also act as a plug, thus checking drainage; and if the carbon core is not produced how do you prevent it—or how should the condition be met if the core is produced?

DR. GORDON K. DICKINSON, JERSEY CITY, N. J.—If we do not happen to have the Percy material and instruments, we can use the method of the late Dr. Byrne, of Brooklyn. For a number of years I have been employing that.

There is one case I want to speak of, a woman with an epitheliomatous cervix of some size. In ten days the uterus was removed, and cancer cells could not be found.

DR. JAMES E. DAVIS, DETROIT, MICH.—The remarks of Dr. Percy recall the classical experiment of the two frogs, when the foot of one frog was placed in the

stomach of another frog. So long as the foot in the stomach of the other frog was alive, that foot was not digested, but digestion commenced immediately when the leg was amputated. The same technical biological law holds as far as this subject is concerned.

In regard to the behavior of tissues after treatment by heat, I have been very much interested in studying some of the sections given to me for diagnosis. I have had the tissues before any work was done, also after one treatment with heat, and then again after several treatments. It is exceedingly interesting to note the changes that take place in these tissues. A living tissue cell must have a circulatory system. In the higher types of life, we have a circulation that is to a large extent within thin walls. Some of the walls have doubly coated vessels, and some are single coated vessels. We have tissue spaces in which there is lymph fluid or tissue fluid; the subjection of the tissue to a temperature that is above what may be called its ultra toleration will bring about interesting intracellular rearrangement. The cell undergoes demobilization, the outline of the cell as perceived under normal conditions is lost; it becomes blurred. Just whether that cell can mobilize or not, is a question. We do know, when we get a mass of cells all demobilized, and there are no intracellular spaces, then it is impossible to have mobilization of tissues. In other words, the tissues are to be considered devitalized. After dealing with the cells we necessarily look to the condition of the tissues, the arrangement of the cells one to another, the different types of cells, etc.

In cancer one of the most important changes that we have to bear in mind is that which we see, for instance, in epithelial tissue in the germinative layer of cells. When this is disturbed, and the growth is below this layer, we have one of the reliable proofs of malignancy. In the application of heat we find the germinative layer is particularly affected; in other words, the normal behavior of this tissue is directly interfered with.

I think Dr. Brown has an excellent idea of going one step farther and depriving these tissues of the blood supply where that is possible. I have examined a number of sections from tissue he has sent to me, and it does seem that by this combined method you do get a very rapid and pronounced result. It practically duplicates the condition that you see in tissues where the natural resistance is being built up against malignancy. There is embolism of the blood vessels, increase of the connective tissue and later on there is scar tissue formation with segregation of the area that is involved in the malignancy. When the blood vessels are tied off and the tissues subjected to heat, it does seem as if you had brought about the conditions that are ideal for arresting the cancer mass. The result is determined by the accessibility of the heat, or the ability to cut off the circulation beyond the area so as to completely isolate it. Accessibility of the cancer tissue seems to be the real difficulty to overcome.

DR. FREDERICK S. WETHERELL, SYRACUSE, N. Y.—Dr. Percy has presented no statistics of any kind, this being strictly a preliminary report. We see cases of inoperable or so-called inoperable carcinoma of the cervix, and repeatedly they die, notwithstanding radium or x-rays. This paper will be widely read, and we would like to have an answer for the men who are discussing this paper *pro* and *con*, what Dr. Percy's experience is in these inoperable cases of carcinoma which go on in spite of the fact that they have had radium and x-ray treatment and ultimately die.

DR. RUFUS B. HALL, CINCINNATI, O.—I would like to ask Dr. Percy whether if a woman during her first labor had an epithelioma in the cervix, as large as a big orange, filling the whole vagina, he would destroy that by the curette or cautery knife before he would use continuous heat.

DR. PERCY, (closing).—I am quite sure that you will hear a great deal more about this low heat method of treating accessible cancer in the near future, for the reason that it has much in it of permanent value in this disease. All it requires is that surgeons learn the methods and indications for its use. The heat treatment, as it has been developed in recent years, follows the lines of recognized surgical procedures. In addition, one is not working in the dark with an uncontrollable agent, but rather with one with which we can always determine the correct limits of its application. It is also infinitely less dangerous to normal structures and to the general well being of the patient than is true today of radium or the more recent deep therapy x-ray apparatus.

In answer to Dr. Brown's question as to the procedure best suited to the destruction of the cancer cells that have already invaded the walls of the blood vessels. It is a most interesting fact that the vessel walls, and also nerve structures tolerate at least a third more heat without permanent injury than other tissues of the body. You can apply the heat to the blood vessels, especially the arteries, sufficient to brown them, and even leave scorched areas such as appear on your toast in the morning from contact with the hot wires of your electric toaster. I have done this many times and I have never seen any immediate or subsequent harm come to the vessels so treated, and the cancer cells in their walls are certain to be destroyed. In some of my early papers I explained this resistance as due to the uniform temperature of the blood which they contained protecting their walls from overheating. I thought this observation original with me, but I found later that Doyen of Paris had made and published the same observation. I have been through a lot of grief in order to obtain the facts as I now know them regarding the action of heat on human tissues, but someone had to get this information correctly. The surgeons who take up this work from now on will have a much easier time. I have taken a mass of cancer that surrounded the whole extent of the axillary vessels and fully two inches in diameter and cleaned that mass from the vessel walls so that no vestige of the disease remained. If the malignant cells have involved some portion of the depth of the walls these will entirely heal over in the general repair that follows the application of the cautery heat. It is well to start the dissection of the pathological structures by beginning in the normal tissues just adjacent to it. This will give one the correct anatomical landmarks that can be followed into the growth with the hot knife. The flat blade of the knife cautery can often be shoved along the blood vessel if it is done quickly, and then brought rather suddenly out through the overlying exuberant mass. This will split the accumulation of cells that surround the vessel, and if you are not too awfully slow in this maneuver you cannot possibly do any injury to the vessel walls. When the mass is split it is a comparatively simple procedure to push the remainder of it entirely away from the rest of the structures to which it may be adherent, with the nose of the cautery knife. It is most impressive how resistant these blood vessels are for a very short time to the application of a cautery knife that frequently has a temperature of from 600° F.—800° F. The stumps of the small arterial branches that are necessarily severed in this way are tied with No. 1 plain catgut. The fundamental thing is that cancer cannot be successfully transplanted after it has been heated for ten minutes to 113° F., (45°C.) Cancer really seems to abhor heat.

As to my statistics:

I am frequently asked about these. Frankly, I have never been greatly interested in my results merely as results. My chief concern has been to know whether I could destroy an otherwise inoperable mass of cancer so that the patient would live free from the further plague of her disease. So far I have been able to do this in 17 per cent of my uterine cancer cases. Please remember that these were

of the utterly inoperable type. They belonged to the class that we have heretofore absolutely refused to do more than try to palliate with morphine. Even if you clean up these malignant growths with the cautery the patient frequently dies because of a coincident myocarditis, or if not this, a surgical kidney which has resulted from the previous sepsis incident to the breaking down of the tumor.

When we are considering statistics in operations for cancer situated at the uterocervical junction we should not forget those of John Byrne. He reported over 60 per cent of his cases alive and well beyond the 5 year period, and no one has ever called in question the correctness of his statistics. Byrne for years thought it was the electricity in his cautery blade that was responsible for his good results, but I found in the last article that he published where he used the word heat for the first time. Dr. Byrne never opened the abdomen to learn the direction of the uterus in the pelvis, but determined this by the introduction of a sound into the cervical canal and up into the body of the uterus. Then with his long handled cautery knife he coned out the entire cervix through the uterocervical junction. His excision often extended through the uterocervical junction into the body of the uterus. When he had completed his operation the vault of the vagina looked not unlike the dome of a cathedral. It was after such an excision that he applied his mushroom shaped cautery tip until he had thoroughly dried out the remaining tissues. I believe that this initial work of John Byrne will finally prove to have been of transcendent importance in the final solution of the treatment of cancer by heat.

I do not want to be understood as decrying the use of either radium, the x-ray or the d'Arsonval current (Diathermy). They still have a place in the treatment of a selected number of these cases. I have had a great deal of personal experience with the last two, and have seen the practical results from the use of radium under the direction of those who were qualified to use it. It is not necessary to detail my experiences with any of these methods or agents except to say that they require expert knowledge of the highest type especially along the lines of the natural sciences. This is something that the majority of those who are now trying to make use of them do not possess, and it will remain a handicap to their most successful use for many years to come. The ease with which all of these agents set up and leave a chronic endarteritis after their application is most discouraging to their more efficient use. The case cited by Dr. Miller is interesting. But that same thing happens time and again.

Ewing of New York said to me a few years ago, that the balance in cancer is easily upset, and it is. But the devilish side to it is the ease with which it is disseminated. Doyen likens it to a shower of pollen distributed by the wind. I always think of cancer reinfection as being as subtle and as mysterious in its possibility for reappearing, after we have tried to destroy it by the usual methods, as is the arrival and spread of the bacillus pyocyaneus in our surgical wards. Cancer sometimes comes almost like an apparition, apparently from nowhere, except where we use the heat and then it does not return in that particular region. Heat effectively heads it off.

There are a lot of patients who are alive and well over the country who have been operated on as Dr. Brown reports. No one so far has brought the number of them to the attention of surgeons. Dr. Rea Smith of Los Angeles had six patients with utterly inoperable uterine carcinoma yet they are perfectly well over the five year period. This, I may say, is not an isolated instance. These were his first cases following my technic, and this report, I report, can be duplicated in many other places not only in this country but abroad.

We are prone to manipulate a mass of cancer too much, too often and too roughly. Some of us are almost as bad in this regard as are the so-called "rub

doctors.'' I am convinced that we loosen fragments of the tumor and set them free in the circulation to take on new virulence in a new location by our thoughtless and indelicate handling of these tumors. Cancer should be treated as far as touching it is concerned, as if it were a most valuable piece of Dresden china.

Regarding the question of Dr. Hall as to the treatment of the large masses of cancer in the cervix, and whether I would clean them up first with the cautery before applying the continuous low heat as I have outlined it in my paper. If giving a general anesthetic, in order to destroy the mass with the cautery does not interfere too much with the natural resistance of the patient to cancer, then undoubtedly its destruction would leave less for the continuous low heat method to do. To destroy as much of the gross mass as is possible at one sitting and then to apply the continuous low heat is, in the largest number of cases, the wisest course to pursue.

I have seen a vagina that was packed full of cancer clear up in a few weeks from the application of the continuous low heat so that there was absolutely no clinical evidence of the disease remaining.

I have received considerable criticism because occasionally my technic is responsible for a vesicovaginal fistula. But if there is cancer near or into the bladder it should be destroyed, fistula or no fistula. What is the use of operating if we are to leave a bladder infected with cancer untreated? It is well to open the bladder suprapubically and apply the heat direct. In this way one can do much more efficient work through the direct application of the heat.

The results in bladder cancer are most gratifying. My first case is alive and well after eleven years. A most important point when the cautery is used to apply the heat is to hold the instrument still or quietly in one place until all of the tissues are fixed by either the cancer, or by an inflammatory exudate are rendered normally movable again. Unless you do that you have not gotten penetration sufficient to destroy your malignant infection. You cannot wobble your heating iron all around as some surgeons do when attempting to get the maximum benefits from the heat treatment. Heat penetration cannot be most effectively secured in that way. It takes time to apply the heat effectively, but it makes the difference between success and failure.

DR. YATES.—How often and how long do you apply the heat to these fixed tissues?

DR. PERCY.—If you make your tissues freely movable from the heat at the first sitting that is usually all that is necessary in the way of treatment. The time required to get this result in the average case is usually about an hour, sometimes less and sometimes over. The time that the patient is on the table does not seem to matter if they are given the minimum quanity of ether which is usually all that is ever required.

DR. LUCIUS A. WING, NEW YORK CITY, read a paper entitled **Hemorrhages in the Newborn.** (For original article, see page 85.)

(*Concluded*)

NEW YORK OBSTETRICAL SOCIETY

MEETING OF JANUARY 9, 1923

THE PRESIDENT, DR. R. H. POMEROY, IN THE CHAIR

(Program contributed by the Junior Staff of the Woman's Hospital)

DR. GEORGE F. HOCH presented a résumé of **The Incidence and Treatment of Syphilis in the Service of the Woman's Hospital.**

Several years ago it became a routine to do a Wassermann test on all admissions to the Hospital. The number showing some serological change was great enough to warrant the inauguration of a clinic for their treatment one and a half years ago.

The hospital having no limited district many patients are received from outside New York City where there are no facilities for their treatment. It seemed therefore all the more urgent that the hospital have a clinic for their care.

The diagnosis with very few exceptions was made on the blood changes. Every patient was subjected to an historical and clinical examination. Only after the proper evaluation of all evidence was the sum total allowed to influence us in making a diagnosis of syphilis.

All tests showing anything but a complete absence of hemolysis were set aside for further study and only on clinical or historical evidence did we make a diagnosis of syphilis.

With the complete absence of hemolysis however we felt safe in assuming that the patient had syphilis, regardless of any other evidence.

The tests were all done with two antigens, alcoholic extract of beef heart and a cholesterinized antigen.

When then are we warranted in making a diagnosis on a positive Wassermann reaction?

The All-American Conference on Venereal Diseases considered all frank Wassermann reactions as positive with the following exceptions:

(1) Absence of luetic history with positive Wassermann diagnosis made with care and another Wassermann done.

(2) Weak reactions cannot be accepted and call for further study.

(3) Negative Wassermann cannot be regarded as proof of absence of lues.

(4) Cholesterinized antigen being very sensitive, is of particular value as therapeutic index.

(5) Negative reaction is no indication for stopping treatment.

Together with these exceptions may be added yaws, which is never present in this climate and can be disregarded, leprosy, some cases of relapsing fever, and febrile stage of malaria. With moderate caution all these pitfalls can easily be avoided.

Many of our patients gave histories of frequent abortions which we considered of clinical importance. Williams has shown that one out of every five abortions is due to syphilis. As the evidences of the disease, in women, are often masked, especially in colored women, who have no distinct recollection of rash or mucous patches it seemed that we were warranted in starting treatment with no more evidence than a complete absence of hemolysis in our serum.

During one and a half years there have been 3130 admissions to the Hospital and patients in the Out-Patient-Department on whom Wassermann tests were done independent of the Obstetrical Service. Of this number there were 158 cases of lues in the wards and 117 in the Out-Patient-Department, 8.7 per cent.

On the Obstetrical Service there were 495 admissions with eight positive Wassermanns after four to six weeks. It is our routine always to check these.

This discrepancy is readily appreciated when we note that 75 per cent of the positive reactions in the ward admissions were on colored patients, who are potentially classified as "those who are and those who will be syphilitic". There are no colored patients admitted to the Obstetrical Service.

Practically all of the four per cent who showed active lesions were from the Dispensary. Four primary lesions were seen, two on the cervix and two on the labia.

We had four living children with positive cord Wassermann reactions, only two of which have returned to the clinic for treatment or observation. We do not make a diagnosis of congenital lues on a cord Wassermann in the absence of clinical findings. Many positive cord Wassermanns have negative blood Wassermanns after four to six weeks. It is our routine always to check these.

If however there is any evidence of the disease such as eruption, enlarged spleen or liver, which occurs in 55 per cent of congenital luetics, or rhinitis which occurs in 48 per cent, according to White and Veeder, treatment is instituted immediately.

We have tried to standardize the treatment so it simplifies the handling of the cases. Neoarsphenamine and mercurosal are used at weekly intervals except the very early cases when the effort is made to sterilize the patient quickly by more intensively using the arsphenamines.

Ten injections of each drug are given which constitutes a series. After a rest period of one month a Wassermann is taken and treatment is again given in the acute cases regardless of the Wassermann reaction. In the latent cases if the Wassermann reaction is negative, treatment is checked.

We regard the rest period as essential, for it allows of the elimination of the arsenic and mercury, both of which have a cumulative action and by pushing we may bring on untoward reactions.

When the patient is susceptible to the neoarsphenamine we use silver salvarsan which acts just as efficiently in sterilizing the patient. In our series of cases we have had as many negative serological results with this preparation as with any of the others. So far we have neither observed any reaction or argyria.

All patients before being discharged receive a lumbar puncture. Stokes and Fordyce and Rosen have shown that 25 per cent of syphilitics show changes in the spinal fluid early in the disease. These patients even with negative physical findings are potential tabetics or paretics.

The patients with neurological changes either symptomatically or serologically are given the routine treatment and if they do not respond to that are given arsphenaminized serum intraspinally which we feel is indicated in some of the cases.

All patients who show a positive Wassermann in the antenatal clinic are sent to us for treatment. The question has often arisen "should syphilis be an indication for inducing an abortion?" We do not believe so, as many children born by syphilitic mothers do not have the disease. But the woman when pregnant should be treated during the entire pregnancy and there is very little likelihood of the child becoming syphilitic. It is inadvisable to start treatment late in the pregnancy as this may cause a Herxheimer reaction. If there are active lesions treatment should be given at any time. The mothers are watched all during the course of treatment as to their kidney function. We make the further change in these cases of giving the drugs separately. The arsphenamine is given first and lately the mercury to avoid the irritation of the latter on the kidneys, and the further accumulation of the arsenical with its possibility of causing dangerous reactions and eclampsia.

It is too soon to report on the prognosis of our cases as the work has not been carried on sufficiently far enough. But it is comparatively easy to sterilize the patient and in 22 per cent of our paients we have had negative Wassermann reactions at the end of one series.

Dr. Frederick J. Matthews discussed the **Relation of Orthopedics to Gynecology at the Woman's Hospital.**

The Orthopedic Clinic at the Woman's Hospital, was started in May, 1920, to ascertain the cause of backaches in clinic patients, who did not present conditions to warrant treatment or operation. Also, where the correction of the gynecologic condition had been made without relief of symptoms.

Since the opening of this department 43 cases were referred who did not show any orthopedic conditions to cause their symptoms. Three hundred and ninety-two cases have been referred who presented the following orthopedic conditions:

Marked increased lordosis	20	
with short tendo achilles and weak feet	64	
with short tendo achilles	43	
with arthritis	32	
with marked scoliosis	5	
with marked rickets and lateral scoliosis	1	total, 165
Sacroiliac subluxation following labor	10	
with scoliosis	1	
with arthritis	3	total, 14
Sacroiliac subluxation following injury or strain (muscular)	19	
with increased lordosis	1	
with weak lateral or metatarsal arches	4	
with weak metatarsal arches	1	
with arthritis	7	
with short tendo achilles	1	
with short tendo achilles and weak feet (lat. & ant. arches)	22	total, 57
Low lateral and metatarsal arches	9	
with short tendo achilles	15	
with arthritis	3	
with marked rickets and lateral scoliosis	1	total, 28
Low lateral arches only	1	
with short tendo achilles	1	
with short tendo achilles	2	total, 4
Arthritis	23	total, 23
Myalgia	17	total, 17
Lateral curvature	6	
with arthritis	5	
with short tendo achilles	2	total, 13
Long transverse process 5th lumbar impinging on ilium	12	total, 12
Sacralization of transverse process 5th lumbar vertebra	4	total, 4
Short tendo achilles	11	total, 11
Coccyxalgia	2	total, 2
Lumbar Potts	1	total, 1
Flattening of the heads of both femurs relaxation of capsule of hip jt.	1	total, 1
Cases operated on with improvement in symptoms		
Sacroiliac subluxation	12	
Increased lordosis and short tendo achilles	8	
Short tendo achilles	1	
Myalgia	4	total, 25
Cases operated on without improvement in symptoms		
Increased lordosis and short tendo achilles	23	
Sacroiliac subluxation	9	
Lateral curvature	3	total, 35

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The increased lordosis cases are mostly fat women with a relaxed abdominal wall and apparently of sedentary habits. They give no history of sudden onset, of pain in the back, but first complain of a tired feeling followed by dragging sensation in the lower lumbar region, then a backache while in the upright position, this is usually relieved by lying down with knees flexed or a pillow under the lower part of the back. Complications vary these symptoms somewhat according to the condition.

The subluxation of the sacroiliac joints due to prenatal conditions, gives a history of onset of sudden severe pain in one or both sacroiliac joints, from three months previous to delivery up to the patient's getting around after labor. The severe pain usually lasts for several days or longer, slowly diminishing. Pain extends in most cases along the sciatic nerve and around the crest of the ilium towards the symphysis pubis on affected side.

The sacroiliac subluxation due to muscle strain or injury gives a history of moving or lifting a heavy object or a fall, followed by sudden severe pain in the affected joint. Symptoms same as previously mentioned.

Backache, due to conditions of the feet, gives a history in most cases of arch trouble not properly relieved, preceding backache.

Backache of arthritic origin usually gives a history of a rheumatic condition and patient shows arthritic changes in other joints. This condition is most often affected by weather changes.

Short tendo achilles appear to play a very important part in the treatment of patients who have this complication as the limitation of ankle motion usually causes a contraction of the erectrospinae muscles with increased lordosis to relieve the strain on the calf muscles and the feet.

Dr. Edward C. Lyon presented and discussed the **Mortality and Morbidity of Cesarean Section vs. High Forceps Delivery Based on 1000 Consecutive Deliveries at the Woman's Hospital.**

This is a preliminary report based on 1000 consecutive ward deliveries on the Obstetrical Service, from which have been excluded all cases of miscarriage before 6½ months of pregnancy. The cases occurred within a little over two years, during which time there were no changes in the personnel of the Attending Staff and none in our attitude towards indications for interference.

It is rare at the Woman's Hospital to have a case admitted which has not been previously enrolled in the prenatal clinic and studied there for several months, so that emergency procedures are not common. Of these 1000 cases 14 were delivered by high forceps and 20 by cesarean section. One of those delivered by high forceps and one delivered by cesarean section, were emergency cases and had had no previous study.

We consider a high forceps delivery to be one where the forceps are applied to an engaged head, the biparietal diameter of which has not yet passed through the inlet. In all of these deliveries the Tarnier axis traction forceps was used to bring the head to the pelvic floor, after which the Tucker-McLane instrument was often substituted. All cesarean sections were abdominal with a median incision, —part above and part below the umbilicus, and with the uterine incision in the anterior wall and not low down.

Both maternal and infant mortality will be considered and under morbidity any mother or infant who had a postpartum temperature of 100.6 or over, or any

complicating condition which detained either patient in the hospital beyond the regulation time will be reported.

In the 14 cases delivered by high forceps there were no maternal deaths.

In the 20 cases delivered by cesarean section there were three deaths, as follows:

CASE 1.—Toxemia, eclampsia, acute suppression of urine, edema of the lungs. This patient was in the hospital for observation and treatment of toxemia for six weeks prior to delivery, in the hopes of obtaining a living child. She showed a satisfactory improvement and induction did not seem indicated. Normal pelvis, history of one miscarriage, no labors. At eight months she spontaneously went into labor, membranes probably unruptured, though this could not be definitely determined. Poor pains, slow progress, rigid cervix admitting one finger. Insertion of Voorhees bag advised. This was followed by severe convulsion, rapid change in patient's condition for the worse, blood pressure rose from 130/80 to 210/100. Catheterized specimen of urine showed 65 per cent sediment of albumin on boiling with acetic acid. Cesarean done as quickest means of emptying the uterus, uncomplicated operation, one convulsion postpartum. Condition became worse and patient died 85 hours postpartum. No autopsy.

CASE 2.—Peritonitis. Patient never in prenatal clinic, admitted as emergency, interference outside the hospital. Eight months' pregnant, vertex, normal pelvic measurements, history of one normal living child. Two days before admission severe hemorrhage, was packed by physician at her home; packing removed next day. Subsequent hemorrhage and patient was admitted to the hospital. Patient in good general condition—almost complete placenta previa, two vaginal examinations, uncomplicated operation. Patient died 88 hours postpartum. No autopsy.

CASE 3.—Peritonitis, septicemia, positive blood culture. While in prenatal clinic patient under treatment at St. Luke's Dispensary for chronic pulmonary tuberculosis, poor general condition; at term, vertex, normal pelvic measurements; history of one miscarriage; one previous cesarean section. History showed patient was operated on six hours after onset of labor, indication for which could not be determined. Spontaneous, dry labor—patient given test of labor, with four vaginal examinations in hospital. Uterine inertia, rigid partly dilated cervix, persistent O. P., exhaustion of patient. Uncomplicated operation. Patient died 73 hours postpartum. Diagnosis confirmed by autopsy.

Mortality, infant. In the high forceps deliveries there were two stillbirths, in both cases baby alive before patient was taken to the delivery room. One of these was complicated by a prolapsed cord and both were persistent occiput posterior positions. There were two deaths. One died on the second day from cerebral injury and was a case of persistent occiput posterior. The other died on the sixth day from the same cause. The former had a marked asphyxia pallida and was resuscitated with difficulty. The latter had a moderate asphyxia livida and was resuscitated with ease. In the cesarean sections there was one death 7½ hours postpartum from atelectasis. Operation for former ventral fixation, discharge of meconium noted before operation.

Morbidity, maternal. In the high forceps delivery three cases showed a reactionary temperature not extending beyond the second day. Five cases had a temperature due to sapremia, four with a temperature one day, one with a temperature three days. All were treated by posture only and discharged in good condition.

In the cesarean section cases all showed the usual postoperative rise in temperature but in addition to this there were four cases with a temperature due to sa-

premia. These were treated by posture only and discharged in good condition. One case of pyelitis, one of saphenous phlebitis, were discharged in good condition. There were three cases of wound infection, all superficial and involving only the skin and subcutaneous fat. Two were discharged in good condition and one unimproved, this patient being operated upon because of an epithelioma of the vulva.

Morbidity, infant. In the high forceps cases there was one case of facial paralysis, unilateral, much improved at time of discharge. In the cesarean section cases there was one case of fracture of the middle third of the femur due to difficult extraction of the baby and a tight uterus. Firm union on discharge. Slight deformity.

DISCUSSION

DR. JOHN O. POLAK.—If I understood Dr. Hoch correctly, he made the statement that there was danger and no advantage in treating syphilitics late in pregnancy. That is rather at variance with the experience that we have had in our clinic, no matter at what stage of pregnancy the syphilitic appears and receives treatment, there have not been any untoward results, and the advantages have been very considerable, particularly for the baby, even when those patients had but very few injections.

The second point I would like to refer to was a point brought out by Dr. Lyon. It was rather interesting to me to note the record of high forceps he reported. This is an operation I had supposed had been relegated to past history. He modified his statement as to high forceps, but yet was very clear in stating that the largest diameter had not passed the brim, and as these cases had all been followed in the prenatal clinic, it seems to me that 14 cases of high forceps was an extremely high incidence, and that the loss of four babies was directly due to that procedure.

DR. JAMES V. RICCI discussed **Commercial Preparation of Gum Glucose and Demonstration of Its Effect on the Blood Pressure of the Rabbit.**

1. *The Preparation of Gum Glucose.*—Gum acacia and glucose are given intravenously at the Woman's Hospital to prevent and to combat shock incident to operation. A solution of six per cent gum acacia and twenty per cent glucose sterilized in sealed ampules, each containing 300 c.c. is prepared by Squibb and Company of New York and is kept ready in the hospital on ice for emergency use. When desired for use, the ampule is placed in a basin of hot water just below the boiling point for three to five minutes. The lowest point of the ampule is then sterilized with alcohol flame, the glass filed with sterile file, and the rubber tubing attached. A graduated glass pipette with a connecting "Y" will give the rate of flow per minute, which for a patient of 150 lbs. should be 3 c.c., for 200 lbs. 4 c.c., for 100 lbs. 2 c.c. The rate is based upon the physiological rate of absorption of glucose, which varies with the body weight of the patient. A thermometer in the tubing shows the temperature of the solution which should be approximately 105° F. For the maintenance of a constant heat level we depend on a specially constructed electric apparatus, so fashioned as to envelop both ampule and rubber tubing. One ampule is sufficient for an ordinary operation; if need be a second ampule may be attached in a similar manner.

2. *Object of Gum Glucose Injections.*—The object is to maintain blood pressure by maintaining the blood volume, not to increase the tension in the arterial walls

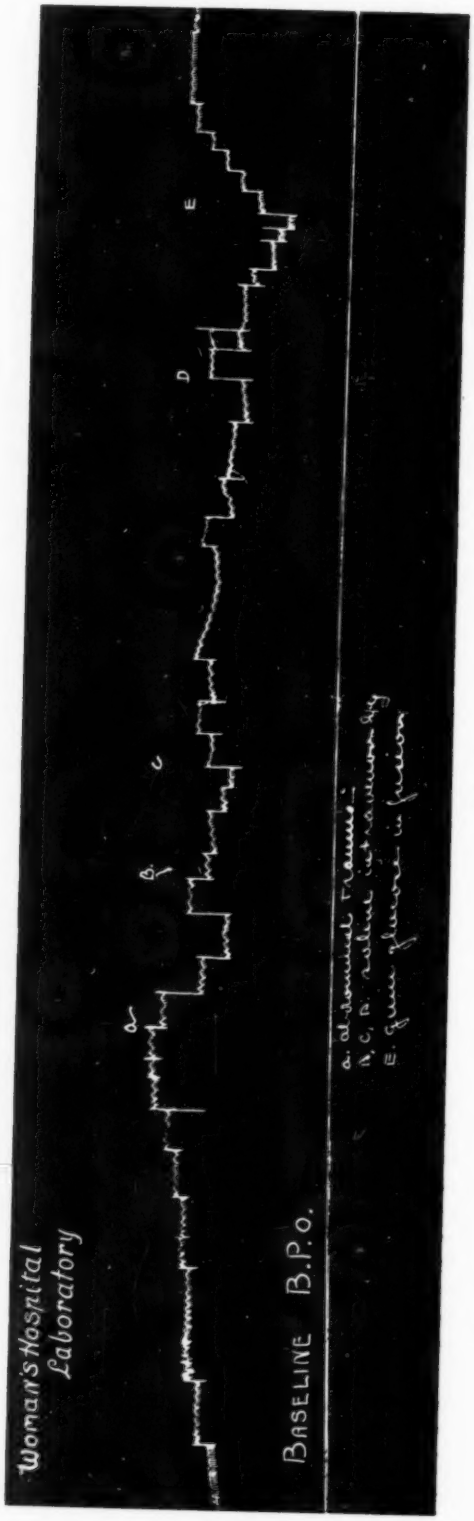

Fig. 1.

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as is done by adrenalin or digitalis, and thereby causing a diminution in the flow of blood to the tissues and especially to the kidneys. Shock may be caused by hemorrhage from the body or by hemorrhage into the patient's capillaries—that is, concentration and stagnation of cells in the capillaries, and loss of plasma from the circulation. If by hemorrhage from the body, gum glucose, as it is a colloid, will not leave the capillaries, but will attract the remaining blood into the blood vessels and tide the patient over an interval until a donor can be obtained for a blood transfusion. If shock is caused by blood lying stagnant in the capillaries due to the alteration of the vessel walls, gum glucose will attract the plasma back into the blood stream and restore the blood volume.

Sir William Bayliss of London has demonstrated that a solution of gum acacia will raise the blood pressure in cats suffering from shock; the accompanying Kymograph tracing (Fig. 1) shows the same result from giving intravenously, solution of gum glucose to rabbits which I had previously rendered in a state of shock.

DR. EDWARD A. BULLARD presented a **Report of Two Cases of Menstruating Fistulae.**

CASE 1.—Mrs. I. H., colored, age thirty, well and robust, admitted to Woman's Hospital, July 7, 1921. Menstrual onset at 13, regular, every 28 days, 7 days' duration, painless, profuse. No miscarriages, one child born in Jamaica, Jan., 1921, by instrumental delivery at term, but no details known. Very stormy puerperium with high fever. During the fourth week a diagnosis of pelvic abscess and toxic insanity made and patient takent to Kingston Hospital. A large abscess was found in the pelvis which was ruptured during the manipulations and before more could be done the patient was *in extremis*. A smaller abscess was promptly evacuated. The sac of the large one on the left side was brought up and sewn into the wound and after the insertion of cigarette drains the abdomen was rapidly closed. Both appeared to be broad ligament abscesses. The symptoms rapidly improved. After a week an écraseur was applied about the protuberant remains of the sac and the mass sloughed off. Patient left the hospital in about five weeks in good condition except for a discharging sinus in the scar.

A slight purulent discharge from this fistula has persisted up to the present time. Menstruation of the same type as before pregnancy appeared in April and after one day of vaginal flow menstrual blood oozed out of the sinus onto the abdominal wall and continued to do so until the vaginal bleeding stopped. This discharge has appeared on the second day of each succeeding menstrual epoch—of which there have been three—and has persisted in moderate amount until the vaginal flow ceased. Patient sought operation for the cure of this sinus; is otherwise in excellent health.

Examination showed a five inch midline scar below umbilicus, in the lower end of which is a sinus admitting an ordinary probe downward and backward about five inches. The uterus feels normal but somewhat fixed to a right-sided, soft, globular mass about three inches in diameter.

Urine and blood normal. Urethral smears and Wassermann, negative. Rubin test for tubal patency tried with the entrance to the sinus submerged under a little pool of water. Under 50 mm. mercury pressure the CO_2 gas bubbled out of the sinus and when patient sat up the classic sign of shoulder pain was noted and gas seen under the diaphragm by the fluoroscope. This proved that the sinus connected with the uterine cavity and made it seem certain that the other tube was patent.

On July 15, 1921, a supravaginal hysterectomy, bilateral salpingooophorectomy, excision of salpingoabdominal sinus and appendectomy done. By long elliptical incisions the whole scar and sinus were excised in one mass. On entering the abdomen it was seen that the sinus was the left fallopian tube with its fimbriated end embedded in the scar. The tube was slightly enlarged and the lumen a bit dilated but there were no adhesions about it. The left ovary a little enlarged, buried under adhesions to the uterus, and on dissection sterile pus exuded. The right ovary was transformed into a cyst of about four inches diameter. The right tube ran across

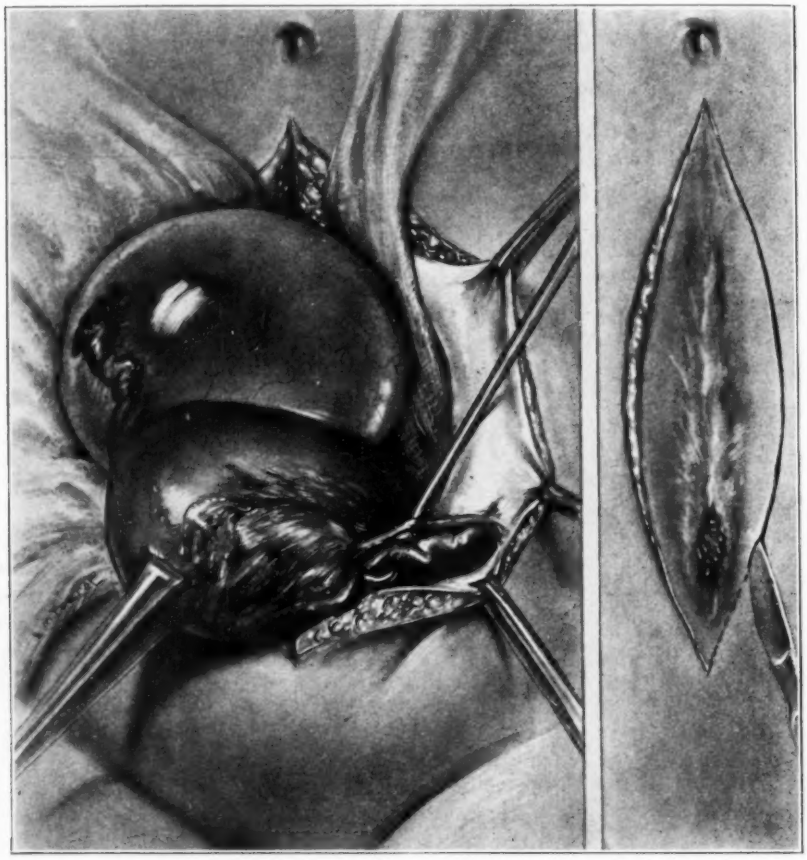

Fig. 2.

the top of the cyst, appeared normal, and the Rubin test had already proved its patency. Light omental and intestinal adhesions to the back of the cyst and the uterus (Fig. 2). Uterus, appendix, kidneys and gall bladder normal. It appeared unwise to consider conservatism and accordingly complete ablation of uterus and adnexae was done. Prophylactic appendectomy also done. Because of the spill of pus from the ovary a cigarette drain was inserted and the abdomen closed.

Patient had a normal convalescence, the highest temperature being 101° rectal. Discharged on the twentieth day, drainage tract closed, wound healed, pelvis normal to palpation.

Microscopical examination of the offending tube showed "thickened fibrosed wall

with marked edema and congestion. The blood vessels engorged, their walls thickened and sclerosed. Some areas of mucous membrane are infiltrated almost exclusively with round cells, others show polymorphonuclear leucocytes and a large number of plasma cells. Small abscesses are frequent. Also marked perisalpingitis. The other tube presents the same picture. Uterus moderately fibrosed and endometrium hyperplastic.''

CASE 2.—Mrs. M. X., age 31, entered Woman's Hospital, March 12, 1922. Married eight years, four children, all normal labors, and no miscarriages. Menstrual history was entirely normal.

In December, 1920, patient's last child was delivered normally, but puerperal sepsis followed. She got up in three weeks but constant pelvic pain and poor health persisted until she was compelled to submit to laparotomy on April 17, 1921 at the Flushing Hospital. The details of the operation were not obtainable but she understood that ''an ovarian abscess'' was found. A drainage sinus remained which has never healed. In July, an abscess appeared in the left groin and after incision this was found to communicate with the main fistulous tract. Three more sinuses opened soon after on the left lower abdomen and all five continued active.

The baby was weaned in August, 1921, and the mother's general health improved. In December, 1921, menstruation appeared for the first time and lasted three days. During all of this epoch blood resembling menstrual blood came out of the original sinus quite freely and recurred for three months that followed until her operation in Woman's Hospital in March, 1922. More blood discharged from the fistula than from the vagina but the vaginal flow persisted nearly a day longer. During the intermenstrual intervals there was a constant but very slight seropurulent discharge from this sinus but never any blood. All of the other sinuses continued to discharge pus in moderate quantities but none of them showed any sanguinous flow during menses.

The Rubin tubal patency test was done and under very low pressure the gas passed into the uterus and out of the sinus in the laparotomy scar, but none passed into the abdominal cavity.

On March 16, 1922, Dr. Herman Grad operated. The sinus in the laparotomy scar was first probed but no information gained and abdomen then opened through the scar. A large tuboovarian inflammatory mass occupied the left side of the pelvis adherent to small intestines, sigmoid, bladder and lateral pelvic wall. The left tube ran from the mass upward and forward to be attached at its fimbriated end in the old scar. This was the menstruating fistula. The other four sinuses communicated with the inflammatory mass separately across the top of the bladder or down the lateral wall of the pelvis. The greatest difficulty was encountered in the release of adhesions and entire excision of the left adnexa and these sinuses. A loop of small intestine and the sigmoid were torn and repaired. The right appendage had been removed at the previous operation. Abdomen was closed with drainage.

The wound became badly infected and required several counter incisions.

The laboratory report stated that the tube wall was thickened, lumen containing purulent exudate. Mucosa almost entirely replaced by an exudate of lymphocytes and polymorphonuclears. One area still shows thickened rugae, invaded by plasma cells as well, with considerable hemorrhage. Ovarian tissue partly necrotic.

Menstruating fistulae have been reported by Bland, Thomson, Landsberg, Bond and Thorn. But when we bring up the question of the origin of these periodic bloody discharges and their nature we plunge at once into the old unsettled problem, ''Does the tube menstruate?''

Many of the cases of menstruating tubal sinuses reported in the literature are

of no assistance in the determination of this problem because the tubes, as in the two cases of our own report, were pathologic, or because their condition might have been influenced by uterine or other adjacent pathology. As Novak rightly claims "To be of value in such a study the removed tubes must be free from pathological changes, they must not be injured in removal, and they must be placed at once in the fixing fluid. In addition there must be an accurate history of the case, especially from the standpoint of the menstrual dates and the freedom of the patient from any condition, whether general or local, which might influence the periodicity of menstruation." No large series of cases has been worked up in this manner.

There is considerable variety of opinion on tubal menstruation. Whitridge Williams says that the tubes "show distinct cyclical changes both in the epithelium and connective tissue" but "ordinarily take no part in the menstrual function." Graves thinks the tubal mucous membrane probably does not share in the bleeding as a rule but that tubes inspected at operation during menses have sometimes indicated an associated tubal menstruation. Delporte investigated many normal tubes removed during menstruation. He found diapedesis of red cells and expulsion through the mucosa into the lumen of the tube, a condition resembling menstruation, but he did not consider it a true menstruation. Bond studied the uterine ends of quite a few normal tubes which had been removed during menstruation in operations for cystic ovaries, fibroids or retroversions. He found red cells passing through the mucosa into the lumen of the tube, and thought certain cases of hematosalpinx without pregnancy could be thus explained. He felt sure that the blood found in the tube was not a regurgitation from the uterus because the tubal menstruation preceded the uterine in some of his cases. DeLee thinks some degree of tubal menstruation probable, because tubes fastened into abdominal incision have periodic bloody discharges, hematosalpinx points to this origin, and a decidua menstrualis was found in the tube by Arendt. Goffe found after vaginal hysterectomy the uterine end of a tube attached to the vaginal stump, and menstruation occurred into the vagina several times until the tube was thoroughly destroyed by cautery. Holzbach showed various periodical decidual changes in the tube. Leopold and Martin found small areas of epithelial desquamation in the tubal mucosa, the epithelium of which, however, was renewed much slower than during menstruation.

On the other hand many observers seriously doubt genuine tubal menstruation. Jaageroos examined many tubes taken out with the uterus for cervical cancer and never found blood in a normal tube. Crossen admits that the general congestion at menses may result in a slight effusion of blood into a normal tube but thinks menstruating fistulae are due to the pathologic condition of such tubes. Moraller and Hoehl admit the problem is not settled. They think there is usually no bloody secretion in the tubes at menses. They believe that nearly all observations that have been made on the subject are open to criticism because they were made upon pathologic tissues. Frankel says, "A true menstruation in the sense of typical mucous membrane changes as described by Hitschmann and Adler does not occur in the normal tube. Hemorrhage into the tubal lumen always represents a pathological process."

DISCUSSION

DR. ROBERTS L. DICKINSON.—Bearing on the matter of tubal menstruation, I would state that I sterilize patients in the office by occluding the tube and passing a sound with a cautery tip on it. This produces a slough and closure by a circular scar, of the ostium uterinum and either a hydrosalpinx or a hematosalpinx results in about one-half of the cases for a little while. In examining them right after menstruation with the idea that they may fill up with menstrual

blood, one finds that tubes do not continue filling month after month, which shows that the tubes do not go on menstruating. If tubes menstruate scantily and only a few drops work back into the peritoneum, the peritoneum is able to take care of it. Therefore it would seem there cannot be any large amount of tubal menstrual blood, if any.

DR. HERMAN GRAD.—Dr. Bullard did not mention the fact that this patient stated that she menstruated eight different times through this tube and that the menstrual flow ceased about two days before the uterine flow ceased. It is of interest to know that the duration of the tubal escape was not as long as that from the uterus.

DR. GILMAN S. CURRIER presented **A Compact Apparatus for Determination of Patency of the Fallopian Tubes in Sterility and Method of Use.**

A very small tank of carbon dioxide in liquid form holding 8 c.c. at a pressure of 1000 pounds per square inch is contained in a shell which forces it down upon a hollow needle perforating the sealed end of the steel capsule (tank) and fitting the shoulder tightly against a rubber washer. Thus the gas is released and ready for use, the rate of flow to be regulated by a delicate needle valve. One cylinder will suffice for two or three patients or more if they are examined the same day, but, inasmuch as the tanks are worth only a few cents a piece—new and charged—it is simpler to use a new tank for each patient.

A quart wide-mouthed bottle with a two-holed rubber stopper is filled with water to the level shown in the illustration. Through one opening of the stopper comes the glass tube of the volumeter (used by Wallace & Tiernan for measuring chlorine and used, inverted, for irrigation in the Carrell Dakin treatment of wounds in the war.) This glass tube contains a syphon and is of about 50 c.c. displacement, used to measure the volume of gas passed. Each time the hollow glass chamber is emptied (which happens suddenly after gradual filling) 50 c.c. of gas have passed, seen bubbling through the water. This gas passes through the glass Y-shaped tube in the second hole of the rubber stopper to a U-shaped double column of mercury through the one arm and to the patient through the other (Fig. 4).

A funnel (''thistle'') on the top of the tube containing the mercury allows it to be poured in if carried around in a bottle. There is a millimeter sliding scale on the tube containing the mercury on which zero is made to correspond to whatever the level of the mercury may be. The free arm has a bend to support the rubber tube connecting the volumeter and gas tank.

From the free arm of the glass Y-shaped tube the gas passes in rubber tubing into which is inserted, somewhere in its course, a two-way pet-cock allowing it to be directed on into the patient or to escape at will. A flexible hollow tin sound No. 15, perforating a rubber acorn tip to a urethral (prophylactic) syringe constitutes the terminal attachment of the rubber tubing. The advantages of this over the steel sound are two-fold: better coaptation of the rubber against the cervix can be obtained because it can always be made perpendicular to the cervix by bending and, secondly, the sound can be curved to suit the contour of the uterine cavity whether anteflexed or retroflexed.

The outfit being portable (Fig. 3) can be carried to the home, office or operating room, whether it be encased or in a hand-bag. That there are no ill effects from the

procedure is shown by the fact that out of over 600 cases at the Woman's Hospital no harm has resulted. Inasmuch as it is necessary to introduce the flexible sound into the uterus, sterile surgical technic is necessary. The contraindications to this invasion of the uterus by a foreign body would prevent use of the apparatus, the most objectionable feature being a badly diseased cervix, although no harm has been experienced from chronic conditions of this kind but the test is obviously superfluous as endocervicitis should be cured before other causes of sterility are sought. Acute salpingitis would naturally contraindicate the test more from the point of view of inadvisability of intrauterine manipulation, than anything conveyed by the gas into the abdominal cavity, for the gas would not pass, as also in the premenstrual period when patent tubes may seem obstructed.

The cylinder is introduced into the shell (fitting only one way) and with the needle-valve closed, the shell is screwed down as far as possible, pressing the cylinder by the hollow needle, freeing the gas.

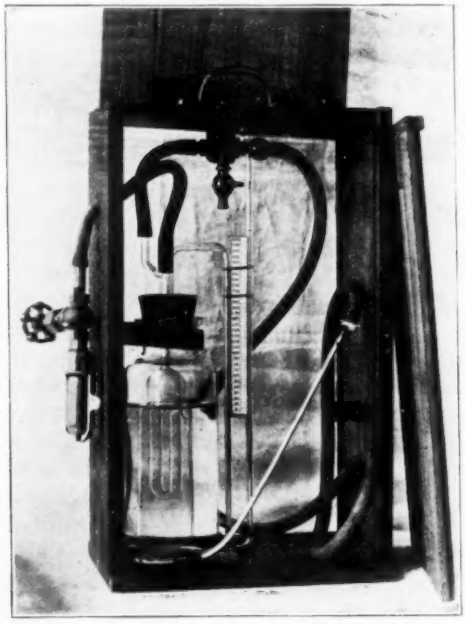

Fig. 3.—Currier apparatus for determining tubal patency.

The tank is then attached to the volumeter by rubber tubing and the flow of gas so regulated, by turning the needle-valve, that with both sides of the two-way pet-cock closed the pressure as shown by the mercury manometer does not rise too rapidly for safety, a rise of 5 mm. of mercury per second being a good standard, which, once set, is allowed to continue until the test is finished; the pet-cock being opened, the gas is allowed to escape till ready for the test so that the pressure no longer rises or the mercury will be blown out of the tube if the pressure is allowed to rise above the limit of the scale.

After iodinization of the cervix and insertion of a bivalve speculum, to introduce the sterile sound the tip of which is bent to suit the contour of the uterine canal and the rubber acorn about 1 to 1½ inches from the tip, the cervix must be grasped with a tenaculum which should of course be outside the canal in order not to interpose between the rubber and cervix. Novocaine may occasionally

be necessary for this but usually can be dispensed with. The whole procedure can, on the other hand, in a very sensitive patient, be done under general anesthesia, gas or ether as it is not necessary to rely on any subjective symptoms on the part of the patient (later taken up as right shoulder pain).

When the rubber on the sound is firmly pressed against the cervix no gas

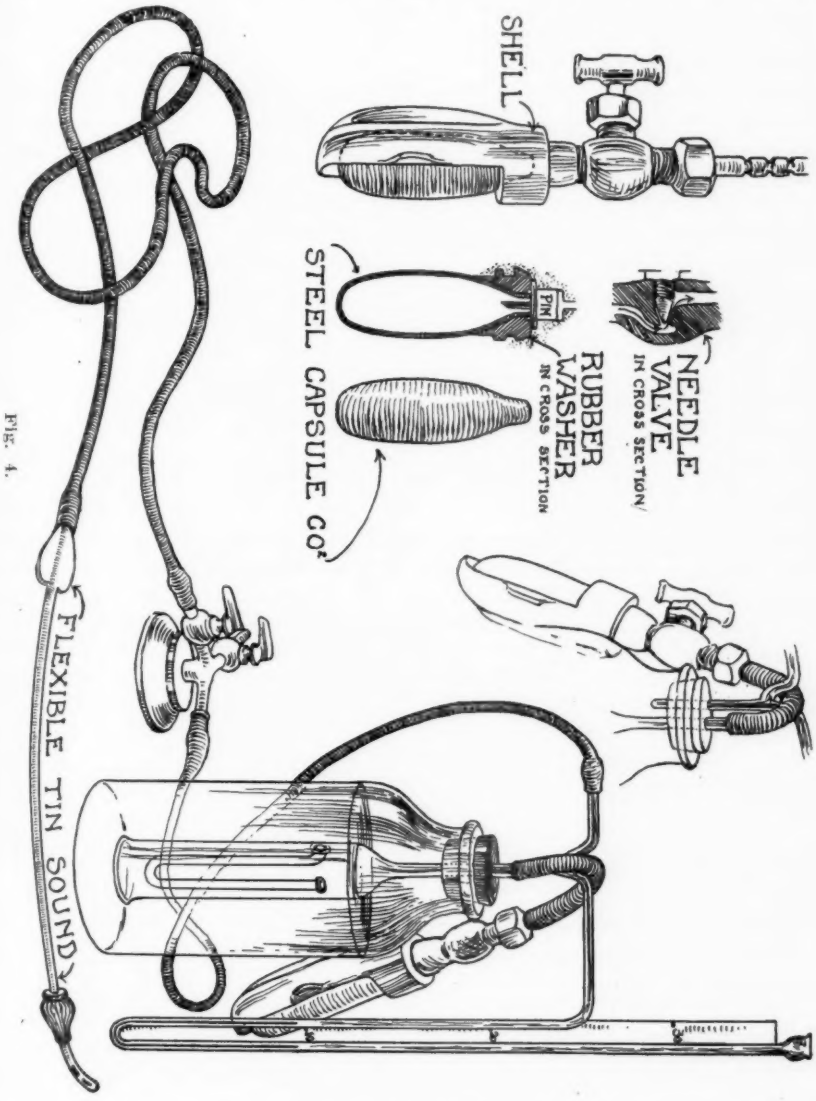

Fig. 4.

escapes from this source. If imperfect coaptation exist it is detected by gurgling and sense of vibration felt through the metal (tenaculum and speculum), and an irregular and unsteady drop in the column of mercury.

When the pet-cock is closed the pressure as shown by the column of mercury will rise constantly till obstruction is overcome (provided no leak is allowed from the cervix) which, in the normal case will be around 60 to 90 mm. of mercury and will not rise higher although in a normal case it will first occasionally

reach a point somewhat above the level set (90) but promptly drop back to that level and stay there. If a stethoscope be applied to the lower abdomen above the pubis, gas can be heard passing through into the peritoneal cavity, all of which is quite painless.

Patency can be determined after as few as two or three excursions of the volumeter—that is—after 100 to 150 c.c. of gas have been passed into the abdomen. A greater volume is usually employed unless the patient is very sensitive. A maximum of 300 to 400 c.c. is often allowed to pass into the abdomen. Then, if the patient be conscious, which is not at all necessary, and sits up, she will usually have right shoulder pain due to subdiaphragmatic irritation by the gas, which it is easy to demonstrate by the fluoroscope in the form of a white line of separation between the liver and diaphragm, but too awkward for clinical use.

In partially occluded tubes, as those chronically diseased or the engorgement just previous to menstruation in normal tubes, the pressure rises up to 150 mm. more or less showing difficulty for the gas to pass through.

In tubes that are completely closed the pressure goes steadily up as high as one cares to allow, which upper limit has been found to be 200 mm. mercury, as rupture is possible above that pressure. The nature of the obstruction will affect the behavior of the mercury column; thus it has been found to go up to 200 mm. three times and the third time just as it would reach the 200 mark, it would drop to 60 or 80 and remain there showing patency established—probably velamentous adhesions broken up—showing the therapeutic possibilities. If in such a case the procedure were carried out once a week, later work will probably show retained patency and therefore cure some cases of obstruction without operation.

This brings up the point that in all partially or completely obstructed cases it is well worth while going through three trials at the same time and at intervals. Of all these signs, the behavior of the column of mercury, the right shoulder pain and the fluoroscope, the first and last are the only two that are absolutely constant, and the fluoroscope is too impracticable for office use when the pressure readings will suffice.

The absorption of the carbon dioxide gas in the abdomen is very rapid—much more so than oxygen—and comparatively painless. There will be very little bloody discharge from the cervix as a result of the test, no more than from treatment of that organ.

DR. ALBERT H. ALDRIDGE presented **Insufflation of Uterus and Fallopian Tubes. Report of 600 Cases Examined by the Rubin Method.** (For original article see page 53.)

DISCUSSION

DR. I. C. RUBIN.—Dr. Aldridge started at a point where the method was practically established. I had passed through the experimental stage and had had some undesirable results, as, for example, more pain, pressure symptoms and occasionally syncope, due to too large amount of gas being used and perhaps also to improper selection of cases while I was developing the matter of pressure rate flow. I have nothing but the greatest admiration for Dr. Aldridge's work, and his results are so many and so varied that I could take up a great many of these points in a very lengthy discussion, which is out of the question here.

There is one point which I would like to touch on in connection with the in-

genious device presented by Dr. Currier, which I think has filled a want in the source of gas supply. In watching the action of the little tank I find it will deliver a great deal more gas than is required for two or three cases. If used judiciously, I think it can be used for quite a number of cases.

DR. WILLIAM T. KENNEDY presented a paper entitled **Radiography of Closed Fallopian Tubes.** (For original article see page 12.)

DISCUSSION

At the conclusion of a lantern slide demonstration DR. RUBIN said:

There is only one more point about these cases to which I would like to direct attention. Without the use of opaque solutions, but with the use of the gas test we are in a position to say whether we are dealing with complete closure of both tubes or partial patency, at least one tube being open. I believe we are also now able to tell whether we are dealing with unilateral stenosis or stricture or complete unilateral occlusion in many cases without having to resort to the injection of chemical fluids into the uterus. Dr. Aldridge brought out the point that any pressure above 150 millimeters of mercury indicates stenosis and a pressure above 200 means occlusion. A very interesting symptom which I have found in a fairly large series of cases indicative of a partial stenosis or of complete closure on one side, is the distention pain lateral to the uterus produced by the intrauterine insufflation. I found in checking up this work that where the colic is suprasymphyseal, it is apt to be uterine colic and the gas does not enter the tubes beyond the isthmi and this fact signifies that the closure is at the uterine horns. When the closure is on one side alone and near the abdominal end of the tube as in a case of hydrosalpinx there is a distinct pain on the side on which the closure is present, the manometer, of course, indicating a relatively high rise of pressure on the mercury column. When the pain is bilateral and is associated with a high rise of pressure it is indicative of closure of both tubes at or near the fimbriated ends, and I have been following up these points and comparing them with the findings at laparotomy. That is one of the chief reasons why I have not used this opaque solution in the uterus further and I am glad to be able to state my experience here. I feel that perhaps we should check it up with the laparotomy findings.

I would like to refer to one particular case, a woman now at the age of 26 years, married five years, but sterile, was operated at the age of 15 or thereabout, for a supposedly appendiceal inflammation. The patient was married eventually and was operated by another surgeon for what he thought were closed tubes and to his surprise, found that both tubes had been ablated. This woman is without tubes and is strongly desirous of having a child, and now this procedure can be tried in order to see how much of a stump she may have because she is absolutely bent upon having something done which will improve her chances, no matter how slight they may be. It is in such a case as that which I have just narrated that the introduction of an opaque solution is of great value.

DR. ROBERT L. DICKINSON.—Dr. Cary, I believe, has the priority claim in this matter. He made the suggestion and I used injections of argyrol, and Dudley Roberts took the pictures. In patients rather obese the shadows were poor; secondly, argyrol, not as good a material as sodium bromide, gave poor shadows. When the material goes through the tubes, it diffuses itself into the pelvic peritoneum and obscures the result. In a series of 20 cases, 17 had occluded tubes,

one was partially occluded, and in one in which the fluid went through there were two confusing shadows on one side of the pelvis only.

Now, what we want Dr. Kennedy to elucidate is what will happen in *open* tubes when you throw this fluid through. We want to hear whether, then, the diffusion among the bowels in the lower part of the peritoneal cavity will give you clear pictures or obscure pictures.

Secondly, I might say that there is a simpler method of getting the same result without the cost of the x-ray. You make a bimanual examination and find no evidence of distended tubes. You throw air into the uterus with a pipet and manometer and more goes through than the uterus itself will hold. You then make a bimanual and find you have produced an artificial hydrosalpinx. You, therefore, with your fingers determine some of the things you find in Dr. Kennedy's plates.

The tubal isthmus has been referred to as closed. I believe in a study of the literature that you can find no instance of such a thing as a really grown together ostium uterinum of the tube; that is to say, a closed opening in the sense that the sides are pressed together so firmly that a pressure of 200 will not open it, is possible, but an actual agglutination, which, on section, shows that there is a structural blockade, is said not to happen. I have made some search of the literature in an attempt to find a section which would show a tissue growth closure, but have not succeeded in finding any. Apposition yes, but actual anatomical closure no.

DR. HIRAM N. VINEBERG.—I want to sound a note of warning. One of the great advantages, to my mind, of the Rubin test is that it will do away with a great deal of indiscriminate dilatations, stem pessaries and Dudley operations.

Now, there is just as great danger if not greater if every woman with closed tubes, after being subjected to the Rubin test, should have her abdomen opened. This may do a great deal more harm than we have been doing in the past.

I think Dr. Aldridge deserves great credit for having raised the question as to whether in cases of closed tubes it is worth while to open the abdomen and try to open the tubes for the sake of conception. I think we should emphasize that very point tonight. Now, nature will do things of itself which we with our surgery very often cannot do. How often does it happen that men have tied off tubes by surgical procedures and the patients have become pregnant? Probably a larger percentage than those that had tubes opened by surgery, because in this one instance the tubes were healthy and in others they were diseased.

I reported a case here some years ago in which a pyosalpinx had been removed and an ectopic pregnancy had occurred in the very short stump of the tube that had been amputated near the cornu of the uterus. So, while I feel the work reported here tonight is of great value, I wish to utter a note of warning that not every woman who comes to the doctor's office with tubes that are found to be closed should be advised to have her abdomen opened merely for the sake of becoming pregnant.

DR. GEORGE GRAY WARD.—This work of Dr. Kennedy's, which supplements, of course, Dr. Rubin's original work, I consider has a distinct value. I recognize what Dr. Vineberg has said as a general proposition, but all of us see cases where the patient practically insists that something shall be done on account of her sterility. Just such a case was one of mine that Dr. Kennedy showed on the screen. The patient was a Filipino woman who was married for five years and had never been pregnant. She had had a gonorrheal infection and her husband admitted that he was at fault. They were willing to do anything to have a child. It was an obsession with the woman that she must have a child and she insisted that some-

thing be done. The case was tested by Dr. Aldridge and the tubes were proved to be positively closed. Dr. Kennedy then x-rayed her, which plainly showed complete obstruction at the uterine cornu on the right side and a hydrosalpinx with obstruction at the fimbriae on the left side. The condition was explained to the patient and to her husband. A laparotomy was consented to and I believe it was perfectly justifiable. The findings at operation were identical with those shown in the picture taken by Dr. Kennedy. The right tube was apparently closed throughout and had a nodule at the uterine horn. It was merely a small tube, just like a cord, which had been destroyed by the disease. A satisfactory salpingostomy could not be done on that side. The other was a hydrosalpinx going back of the uterus, and there were adhesions present. On that side I did a salpingostomy with a wide ¾ inch opening and passed catgut down into the opening, suturing it there in the hope of maintaining the patency. The patient is coming in for a further gas test within a few days and if Dr. Aldridge succeeds in putting the gas through, we will consider that it was worth while to do what we did for her. She was relieved of her pelvic pain and as far as future pregnancy is concerned, she is better off than she was.

The valuable point that Dr. Kennedy has brought out in his paper is that when both tubes are shown to be occluded by the Rubin test, it is important to make a diagnosis as to the location of the occlusion in each tube in order that we know whether we can offer the patient the operation of salpingostomy with any justification. When the obstruction is at the uterine cornu the operation is nearly hope less, while if at fimbriated end of the tube, we have some prospect of success.

DR. ROBERT L. DICKINSON.—I would like to ask Dr. Rubin or Dr. Aldridge if they have seen any case in which tubes have been opened by gas and pregnancy has followed.

DR. C. G. CHILD, JR.—I am not at all pessimistic about the operations for closed tubes. I believe they are fully justifiable. I believe that, although many failures follow such operations, as many failures follow all operations in surgery, the failures following the operations for opening the tubes cannot be classed as dangerous to the life of the patient. I have had an encouraging number of cases which led to successful issues, the birth of a living child having followed, several times within ten months after the opening of the tubes, and subsequent children having been born after that time. I have now an encouraging number of children so born.

I feel that all closed tubes should be operated on, if there is no contraindication and the general condition of the patient permits, and provided the husband is fertile.

DR. ALDRIDGE (closing).—In answer to Dr. Dickinson I would say that I know of twelve cases examined by the Rubin method which subsequently became pregnant in from one month to one year after examination. Seven cases were patent and five partially occluded at time of examination. Five of the cases had some gynecological operative procedure done between the time of the test and the time when pregnancy occurred.

One case of one child sterility became pregnant almost immediately after examination. She had been married eight years and sterile following delivery one year after her marriage. She was anxious for a second child and had resorted to various methods of treatment by numerous doctors without result. When she was examined by the Rubin method a high level of pressure was required to start the flow of gas through the tubes. When the gas once began to enter the abdomen it passed through the tubes at a very low level of pressure. Apparently the gas under

pressure had relieved some obstruction leaving the tubes freely patent. The patient had one period before she became pregnant and has since been delivered. I think that I am justified in giving the method credit for this pregnancy.

It is impossible to say in how many of these cases the Rubin method has opened the tubes and allowed pregnancy to take place. It is possible that tubal obstruction may be overcome in a very small percentage of cases, and thereby allow pregnancy to take place.

OBSTETRICAL SOCIETY OF PHILADELPHIA

MEETING OF FEBRUARY 1st, 1923

THE PRESIDENT, DR. WILLIAM E. PARKE, IN THE CHAIR

DR. ALICE WELD TALLANT presented **A Study of the Results in Face Presentations.**

Anyone who wishes to acquire experience in the management of face presentations must be possessed of a goodly store of patience. Even at the rate of the generally accepted estimate of 1:250 cases, data accumulate slowly. Personally I have found these presentations far less frequent in my private practice than in my hospital service. Our figure for the combined hospital and outpatient service of the Hospital of the Woman's Medical College of Pennsylvania show thirty-nine cases in the last 10,000 confinements, a percentage of 0.39. For this study I have added two more, making a total of forty-one. In our series the left mento-anterior stands first, but this is by no means the universal rule.

Of far greater importance is the etiology, since the conditions which cause the malpresentation will also play their part in the treatment and outcome of the cases. I am convinced that the management of face presentations is largely based on these conditions and that to lay down a method for the conduct of a face presentation *per se*, without considering them, is illogical.

Take for a moment the commonest causes, disproportion between the child and the pelvis, malposition of the uterus (usually due to lax abdominal walls in a multipara), and abnormalities of the fetus, and apply them to vertex presentations. No one would dream of saying that the same method of treatment should be carried out in a case of contracted pelvis in a primipara and one of relaxed abdominal wall in a multipara with large measurements. Therefore when a diagnosis of face presentation is made, the next thing is to discover, if possible, what has caused it, before weighing the merits of version vs. conversion, expectant treatment vs. interference.

Multiparity, a factor in the etiology which is always stressed, is the first striking point in our series, as might be expected, with thirty-five multiparae to six primiparae, a proportion of nearly six to one, or 85.3 per cent. One must not be led astray by these figures, however, for in our clinic the multiparae outnumber the primiparae about three to one, so that our conclusion is that a multipara is only about twice as likely to have a face presentation as a primipara.

Of the six primiparae, four had contracted pelves, a point which bears out the statement that a face presentation in a primipara should always suggest the presence of disproportion. Among multiparae disproportion also plays its part, but more often on account of the large size of the child. Twelve in our series had children weighing over eight pounds (the largest an anencephalic fetus of twelve-

and-one-half pounds) and only three showed pelvic contraction of any marked degree.

The fact that anencephali were found five times, a proportion of nearly one to eight, must not be overlooked, and when we add two more malformations and two macerated fetuses, we have surely enough data to justify the contention that the fetus is often at fault, as well as to explain why the gross fetal mortality is bound to be high. Coiling of the cord about the child is also to be listed, but the diagnosis is so seldom made in advance that it is of little practical value. In one of our cases the cord was twice around the neck and also around both feet, and in another, around the neck and body.

The effect of the malpresentation is on the average to prolong labor somewhat, but rapid labor is often noted. The increase in the length of labor is not marked if the comparison is made between face and vertex presentations showing similar accompanying conditions, as dry labor, small pelvis or large child. Early rupture of the membranes is possibly a little more frequent, but again, not strikingly so. As to the perineal lacerations which are so often emphasized as a result of the delivery, I am in complete accord with Cragin's dictum that "much tearing of the perineum is not necessary". In only two of our forty-one patients did any laceration occur and in both cases a single suture sufficed for the repair. As one of these patients was delivered by version and extraction, the perineal tear had no direct relation to the birth of the head in face presentations.

As far as the outcome of face presentations is concerned, the day has long gone by when operative measures were supposed to be a necessary accompaniment of nearly every case. The writers of the present state or quote the proportion of spontaneous deliveries as from 80 per cent (Smyly) to the astonishing 98¾ per cent of Boer. At the same time the reader must be struck with the fact that these same writers note a higher maternal mortality than in vertex presentations and specially emphasize the grave prognosis for the child, giving the average mortality as from 10 to 15 per cent, although lower figures are quoted from a few individual clinics. That anomalies of the child are not largely accountable for this high death rate may be inferred from Cragin's statistics for the Sloane Hospital, in which, after deducting monstrosities and macerated and nonviable fetuses, the corrected mortality remained at 17 per cent. It must be borne in mind, of course, that hospital figures will always run high.

The conclusion is that face presentations, even when ending in spontaneous delivery, mean a serious sacrifice of infant life. After the method of watchful expectancy for anterior positions, we find looming large in the majority of the books, conversion of the face into a vertex, especially if the chin is lying obliquely posterior, as in right mentoposterior, or more rarely left mentoposterior, and the variations and modifications of this procedure are described in full detail. Conversion sounds so simple and logical and lends itself so readily to blackboard diagrams that I have taught it with proper zeal to successive classes for some sixteen years.

One difficulty I always encountered, however, was in citing examples to illustrate and prove its value, for the very good and sufficient reason that we had tried it but twice and both times unsuccessfully. As in other kinds of conversion, there seemed to be a lapse into the previous condition. Bumm long ago recommended version in such cases; Jellett suggests that podalic version is safest for the general practitioner (whatever he may think best for the obstetrician); von Jaschke (in von Stoeckel) and Bar seem to agree with Bumm; Smyly mentions the uncer-

tainty of success in conversion; Kerr goes farther and advises the general practitioner to let face presentations alone; Wallich even emphasizes the dangers of conversion. Whitridge Williams states that in his experience "the conversion of face into vertex presentation is rarely effectual". I wonder whether obstetricians really use conversion to any great extent or whether they are simply perpetuating a tradition.

But what have been our methods at the Woman's Medical College and have we results to justify our failure to employ this long-approved conversion?

First, we rely on "masterly inactivity and watchful waiting" when conditions in mother and child are normal, especially if the position is an anterior. If we cannot quite reach the high plane of some of the figures which I have already quoted, we can show over eighty per cent (82.6 per cent) of spontaneous births in anterior positions and over sixty per cent (61.1 per cent) in posterior positions, an average of 73.1 per cent for the entire series, or thirty out of forty-one cases. In three of these cases we helped the anterior rotation of the chin by manual manipulation during the descent.

Among the operations we have five versions: two were in anterior positions, one performed because the child was passing meconium, the other in an emergency case of a patient long in labor, with whom forces failed. One of the three versions in posterior positions was in a moderately contracted pelvis of the generally contracted type. Forceps were used three times in posterior positions, after manually rotating the chin to an obliquely anterior position under anesthesia. I hesitate to say that in one of these cases we used axis-traction forceps, because I consider the high forceps operation unfavorable for these presentations. A word of explanation is perhaps necessary. We had intended to perform version after the labor came to a standstill, but the patient refused to allow any operation until her husband could be consulted. By that time the head was, we thought, too firmly fixed for version. We have had one cesarean section in a primipara about at term, admitted to the hospital with toxemia and showing the added complications of a flat pelvis and a posterior position of the chin.

Our total number of cases is forty-one without maternal mortality and with only two cases of perineal laceration (and those of minor grade). Of the forty-one children, nine were stillborn or died shortly after birth, but these deaths are easily explained by the fact that two were macerated fetuses, five were anencephalic and the other two also monstrosities (one general edema of the fetus and the other a combination of moderate hydrocephalus, double club-foot and malformed arms). Among the remaining thirty-two normal babies there was no mortality. All were discharged in good condition and many were followed afterward for months or even for a year or two.

Now it seems to me that if a series of cases, some in a hospital, but more in the typical homes of an outpatient service in the downtown district, can give such results, we should no longer so stress the high fetal mortality of face presentations that the general practitioner is led to think a face presentation in itself a sufficient reason for stillbirths or infant deaths. Chiefs and assistants, internes and students shared in the care of these cases, and if so varied a succession of people could bring the patients through satisfactorily, surely not only the obstetrical specialist but also the average physician who does obstetrical practice should be able to help in displacing face presentations from their unenviable position as a cause of maternal and infant mortality.

DR. ANN TOMPKINS GIBSON described a **Method to Facilitate Delivery of Anencephali in Vertex or Face Presentations,** applicable to cases where shoulders are excessively developed, giving rise to severe dystocia, and where version is impossible.

CASE 1.—(West Philadelphia Hospital for Women.) Diagnosed by residents as face, through unruptured membranes. When I first saw the case it proved to be the rudimentary brain presenting, and head was at the spines and immovable. Patient was anesthetized. Grasping the fetal head with the left hand a double loop of 6 inch folded gauze (uterine packing good) was passed over the hand and around the fetal neck, making certain it passed below the mastoid processes and chin. The free ends of the gauze were passed through the loop forming a slip-noose; this was drawn taut and traction downward applied. This method will permit the use of force without injury, and eventually descent of the shoulders was achieved by depressing the acromial ends of the clavicle. Child was living when delivered. Weight 9 pounds.

CASE 2. (Outpractice case, Barton Dispensary of the Women's Medical College of Pennsylvania).

Para v. Face presentation, L.M.A. Anencephalus. Descent ceased at spines. Patient anesthetized and forceps applied; could not bring presenting part to perineal floor. Uterine packing was used in the manner described and child delivered without difficulty.

CASE 3.—(Maternity Department, Hospital of the Woman's Medical College of Pennsylvania.) Para vii. Face presentation, R. M. A. When I first saw patient head was fixed at the spines and version impossible. Diagnosis of anencephalus was made.

Forceps were tentatively tried because head was so large, but failed to hold. The bandage traction method was then used and head delivered. The child was very large, and it was necessary to insert a Braun hook in the posterior axilla to deliver the shoulders, even then delivery was exceedingly difficult; the hips also were impacted.

This last case illustrates the fact that even a very large anencephalic fetus may be thus delivered, once having extracted the head, and having a means of maintaining the traction to assist delivery of the shoulders.

The anatomical peculiarities of anencephali, and the use of wide folded gauze in double length for traction, render decapitation impossible by this method.

DISCUSSION

DR. EDWARD P. DAVIS.—As regards face presentations, I have observed that the situation of the placenta has something to do with the position of the chin. If the placenta is upon the posterior wall of the uterus the tendency is for the presenting part to become anterior in its rotation; if the placenta is upon the anterior wall the tendency is for the presenting part to become posterior in its rotation and mechanism. We have had a number of face presentations, and they have mostly gone on with very little difficulty. Some have been rapidly born, others have been born after prolonged labor. Our rule is to maintain the membranes unruptured as long as possible, keep the bladder emptied by catheter and then wait. If the chin comes down well there is no reason why forceps at the side of the head should not be employed. We never use forceps without axis traction, using the Simpson. If a face presentation turns into an impacted brow it seems to me the choice is section.

In the event of anencephali and other monstrosities I should prefer cleidotomy to the violent traction, believing that crushing and firmly grasping the cranium and cleidotomy I should give the mother a better chance than by very forcible extraction.

DR. RICHARD C. NORRIS.—As Dr. Tallant read the paper, I got the impression that with this tractor considerable force was used and while efficient, the effect on the mother might not be as favorable as it would be to decrease the size of the baby. For the difficult shoulders associated with a monstrosity of this kind the child should be disregarded. It is better to diminish the size than draw a large body through the birth canal. It has been my teaching and practice to always try to determine early in face presentation if the chin is anterior. That having been accomplished I have never had any special trouble with it, but where I have found the chin posterior I have resorted to manipulation and the use of manual means to secure presentation of the occiput or at least an anterior position of the chin. Forceps to the chin anterior position is a simple procedure.

DR. DANIEL LONGAKER.—I believe that, unless conversion is attempted early, it is not a useful procedure. The crucial point in the matter of face presentations is the determination of pelvic contraction and if this exists it should certainly early be determined and forcible extraction entirely avoided. My own preference, there being ample pelvic space, would be an early podalic version.

DR. GIBSON.—In the three cases quoted, it was impossible to do version; they were impacted, and in all it was necessary to use a drastic method. I rely on this method only for extraction of the head, and then accomplish extraction of the shoulders by any suitable means indicated in a given case. In these cases we were able to extract the shoulders without any laceration of the soft parts of the mother.

DR. GEORGE W. KOSMAK, OF NEW YORK, read by invitation, a paper entitled **Fibroid Tumors Complicating Pregnancy and Their Treatment.** (For original article, see p. 63.)

DISCUSSION

DR. EDWARD P. DAVIS.—I have been greatly interested in Dr. Kosmak's paper and there can be no doubt concerning the importance of fibroids complicating gestation. At the present time the trend of professional study lies in two directions. We know the uterus by reason of its anatomical situation and anatomical structure is a fibromyomatous organ. It has been shown by a number of observers, notably by Sampson, that the uterine circulation is a series of isolated entities whereby it is possible for these growths to occur very early, readily, and that this arrangement is rendered necessary by the demand of the uterus for increased size during healthy gestation. Fibrosis of the uterus is not at all an uncommon thing in pregnancy, and in my observation it has explained some cases of slow labor in primiparous women who were married and became impregnated after the usual age of child bearing. In these no tumor was detected, and had I not had occasion to explore by section I should not have known of the fibroid condition. In two cases on whom I operated, one had a second elective cesarean section and the fibroids present at the first had practically disappeared. At the first the uterus was studded with them. There is no question that fibroid is not at all uncommon in primiparae above the usual age of child bearing.

We know that fibroids may not only grow, but they degenerate in the uterine wall and that process is followed by and may become a serious condition. The problem before the profession today in operating for any reason whatever upon nonpregnant women at the time when childbirth and child bearing may be desirable and may properly occur is what to do with the uterus that shows fibroid tumors in view of the possibilities of pregnancy; and that brings up the question of myomectomy in nonpregnant individuals in the interest of future procreation. Studies show that in nonpregnant women subjected to myomectomy 28 per cent of these women will subsequently under favorable conditions conceive. Of these women 10 per cent of them, although they may pass through the first pregnancy successfully, will have a return of the tumor and operation must be repeated in 2 per cent. That does not mean they may not be able to bear a child, but that a fibroid tumor is still there. There may be repeated the operation of myomectomy, or in some cases cesarean section or hysterectomy. From the standpoint of the conservative procedure of myomectomy in nonpregnant women these women may still have saved for them the possibility of childbirth.

We recognize certain indications in these cases as indicating surgical interference. They are first, a woman pregnant with fibroid tumor, the fibroid begins rapidly to grow sometimes with leucocytosis or fever. The second is the location of the fibroid tumor in such a part of the uterus that it is inevitable that impaction would occur when labor begins. It would be unwise not to expect trouble in a fibroid low down in the uterus. The third is the occurrence of hemorrhage, or subsequent infection, or the signs of necrobiosis, especially with bad blood count and hematin dissolved.

As regards myomectomy: each case must be studied on its merit, but I think the profession is apt to take the age of 40 as the time one must consider hysterectomy with serious view. The woman of 23 is in one class, the woman of 30 in another, the women of 40 in a third. However, the mere occurrence of a fibroid tumor *per se*, does not demand operation, for the fibroid process is so constant in the uterus that it must be more than that which draws our attention. In Dr. Kosmak's warning of watchfulness I firmly believe. He made, again, the point as to whether the fibroid penetrates the endometrium, if it does then comes danger of placental infection from vaginal infection. That is a different class from others. In myomectomy in the nonpregnant there are some operators, notably English, who prefer the incision through the anterior uterine wall no matter where the tumor may be. A strong point is made that the entire uterine cavity be explored and incision always practiced through the anterior wall. I am reminded of the remark of a recent writer of gynecology, who is conservative, who thinks that demonstrable fibroid disease in a woman pregnant or nonpregnant is a matter not to be taken lightly and that the degenerative changes with the possible implication of the blood making apparatus of the woman demand careful attention.

DR. RICHARD C. NORRIS.—It has been impressed upon me that pregnancies in women whose fibroids are multiple, submucous, or interstitial, are relatively rare. If they become pregnant they are prone to miscarry. If, at a later period, from the third month to the age of fetal viability, the tumors show signs of degenerative changes, they enter the radical surgical class. So what the average obstetrician will find in his practice from the standpoint of conservative surgery will be largely subperitoneal fibroids. We all do myomectomies in nonpregnant women very frequently. We may have a series of successful cases even in pregnancy, that may make us feel very enthusiastic and then you overreach the indication and disaster comes. In my personal experience I have had more to do surgically with fibroids gone wrong in the puerperal period than during pregnancy. I recall a case, a woman of about forty-two, pregnant, with subperitoneal fibroids, anx-

ious for a child. One of the fibroids became tender, swollen and acutely inflammatory. I sent her to the hospital and watched her. A rising leucocyte count and fever made me think at first that I must operate. She was anxious for a baby. So much impressed was I with that fact that I was not quick to operate. She went through to term and had her baby. Had I operated she would have lost her only child. Another case, three months pregnant, anxious for a child. I did a myomectomy, removed six growths and she went to term. What is the lesson to be learned? If I had a patient today relatively early in pregnancy with fibroid tumor, who had any of the symptoms of inflammatory reaction, she would be sent to the hospital. She is not safe outside. If after a few days of observation, large multiple, nodular, tumors are seriously involved, I decide the case must be operated on and it usually turns out to be a hysterectomy. Later in pregnancy, unless there are very serious and grave inflammatory reactions I believe it is wise to treat them conservatively. With fibroids in the lower segment of the uterus anticipated obstruction, cesarean section is not always necessary. There is a temptation to do it but very often the woman will deliver herself spontaneously, if the lower segment is given time enough to lift the tumor out of the pelvis. The type of case and the period of pregnancy should always influence our choice of treatment. Expectancy will be more frequently employed than surgery, as a rule.

Multinodular, intramural, or submucous tumors rapidly growing in early pregnancy will often require hysterectomy, regardless of the pregnancy. Subperitoneal growths towards the end of pregnancy we nurse along and operate when we feel we have to. It is to this class especially that myomectomy may be applied. In large multinodular obstructing tumors at term, do cesarean section and hysterectomy and give her her baby. We watch in the puerperal period the involuting fibroid and at the first sign of things going wrong prompt operation is indicated. I recall a case with an inflamed ovarian cyst, a Catholic, anxious for a child, I operated on her and removed the ovarian cyst. At the time of operation we found also several fibroids, one of them undergoing necrosis. I felt a hysterectomy was necessary but was not allowed to proceed. The woman miscarried and went through a stormy convalescence and five fibroids sloughed out of her abdominal incision. She recovered. You say Nature will take care of them. She won't take care of all of them. We should be more prompt to operate on fibroids complicating pregnancy. That is my final agreement with Dr. Kosmak.

DR. ELLICE MCDONALD.—I think fibroid in pregnancy should be considered in the light of what fibroid does to pregnancy and then what pregnancy does to the fibroid. I am sure that a great number of cases go through pregnancy without very much trouble for the reason that fibroids are not commonly recognized in pregnancy. I had that experience a number of years ago in our clinic where very few fibroids were reported and I invited the men on the staff to examine very carefully and so we ran through a series of 2600 cases and we found about four times as many fibroids as had been reported previously. In all there were 0.5 per cent. In that series there were only two cases which complicated pregnancy in the sense of fibroid complicating pregnancy by obstructing labor. There were four cases where placenta was retained, a number of forceps operations, not very much over the average, and in no case was there any necrosis of the fibroid, although there was an unwonted number of postpartum hemorrhage. I agree entirely with what Dr. Norris has said in regard to radical treatment of fibroid and that they should be very carefully watched, but I do think that fibroid is getting a hard name in regard to pregnancy because they are not as frequently looked for, not overlooked, but not looked for, so that the actual percentage of trouble, I think, is magnified because we hardly know the total number of cases. There is no doubt that pregnancy sometimes has a very evil effect upon fibroids. It is interesting to try to prog-

nosticate beforehand as to what fibroids will undergo decrease in size. It seems to be chiefly fibroids involved in the uterine wall. A type of what we would call sessile in nonpregnant uterus. Those that have pedicle do not seem to undergo a marked change. I agree with Dr. Norris and with Dr. Kosmak that they need to be very carefully watched.

DR. COLLIN FOULKROD.—I want to add the experience of a limited number of cases and a growing number of fibroids in these cases, to what Dr. McDonald has just said. It has been in my mind during the past two or three years, that we must not condemn fibroids too freely. The fact remains that so many of them go their way for years unrecognized that we are unable to tell the percentage of fibroid in normal labor cases which do not give us trouble. It does not seem to be the situation in the uterine body, whether low or high, but rather in the uterine wall that causes trouble. There are two points I want to call attention to, one hinted at, the diagnosis of appendicitis during pregnancy. I had two patients who came with acute pain and on opening up I found an incarcerated fibroid which I lifted out of the pelvis and allowed the patient to go to term, then did a section with hysterectomy. She made a good recovery. In the second case an appendix was removed and the incarcerated fibroid elevated from the pelvis, this woman delivered herself and is at term with a second child with a fibroid uterus. A third point to remember is that myomectomy sometimes offers obstruction to the possibility of hysterectomy in cesarean section for fibroid. A case in point: a surgeon removed a number of fibroids from the wall of the uterus in a patient in her third pregnant if nothing else intervenes. One other complication to which I did not refer, Because of bleeding and attempts to miscarry, the patient was kept in bed almost the entire nine months. At term the baby was found sitting on a large fibroid in the lower segment of the uterus, the feet extended to the cervix and the vagina, a large ovarian cyst the size of a grape fruit outside of the tumor. This situation precluded a vaginal delivery. It was with the greatest difficulty that we found room to do a cesarean section between the omental adhesions at site of former myomectomies. The placenta was very tightly adherent over the fibroid and excessive hemorrhage followed its manual removal.

DR. KOSMAK (closing).—Dr. Davis and Dr. Norris referred to the question of myomectomy in young women: with the advent of radium we find that a great many women are getting so-called prophylactic doses of radium to stop bleeding and my own experience with a number of these cases has made me extremely careful, because I find that some of these young women, who undoubtedly bled from fibroids of the uterus, which can in some cases be palpated, do not require large doses of radium to stop menstruation altogether and in fact to sterilize them. It seems to me that in a choice of operation and removal of a fibroid tumor and the application of radium, I would prefer the laparotomy with myomectomy rather than the indiscriminate use of radium. Undoubtedly the presence of these fibroid tumors contributes to sterility and, if possible, every woman should be given a chance. I operated on a girl only a few weeks ago who presented a tumor as large as a cocoanut, she was less than 30 years of age, and very desirous of being married. She did not want to enter the marriage state in a condition that probably would not be satisfactory to her husband. That woman's uterus I think is in a very good condition for a possible pregnancy. The fibroid could be removed without disturbing the entrance to the tubes and I have no doubt but that she can become pregnant if nothing else intervenes. One other complication to which I did not refer, is the possibility of uterine rupture. A woman was recently brought to the Lying-In Hospital with a history of placenta previa. She had been in labor several hours which then suddenly stopped. I did not get this history from the woman

as she could not speak English, but the husband told us of it later. Examination showed a mass presenting in the cervix which was soft, about as long as the hand and felt like a projecting placenta. The cervix seemed to be fully dilated, the head was above the brim and I did a rapid version and breech extraction. After I got the baby out I found that what I had supposed was a fully dilated cervix was a rupture which extended out through the lower uterine segment into the abdominal cavity and the intestine was hanging down into the same. The mass which I thought was a placenta was a fibroid in the lower uterine segment which was sticking down into the ruptured cervix. I have no doubt from the history of the case and the denial from the doctor in attendance that he had done anything, that this woman had a spontaneous rupture of a fibroid uterus. It is possible and probable that some of these cases of spontaneous rupture of the uterus may be due to this cause.

DR. ELLICE MCDONALD read a paper entitled **Processes of Tubal Pregnancy.** (For orginal article see page 72.)

DISCUSSION

DR. EDWARD A. SCHUMANN.—Except in a few instances, I am entirely in accord with this presentation, but I do hold it to be a little bit confused as to just why so much stress was laid upon the first accident of extravasation into the tubal wall. If my recollection is correct, I think Veit called attention to this in 1897. I was so taught as an undergraduate and indeed I can hardly recall any careful pathologic study of the subject that has not discussed intramural extravasation. It has usually been termed "hemorrhage, with death of ovum." In Williams' Textbook there is a passage in which Dr. McDonald's words are almost paraphrased. In regard to the scar, I do not believe Dr. McDonald will often find it. If you will remember the process of embedding of the ovum in the uterus where you have decidua, the ovum after it enters the uterus begins to seek for a blood supply and the endometrium is literally eaten away, the great folds of endometrium covering up the cavity and there is no scar. Precisely the same thing holds true in the tube, the ovum embedded, begins to digest its way into the structures of the tube. Dr. McDonald also said this type of so-called tubal abortion was neither tubal pregnancy nor abortion. It is tubal pregnancy because it is bounded by the serous surface of the tubes and anything within the serous surface is tubal. As to separation of muscle fibers and final escape of the ovum by fimbrial rupture, that is an accident which does take place occasionally. It is much simpler for a tubal ovum by protoplastic activity or mere pressure to get back into the already partially eroded mucosa than to dissect out of all these muscle bundles. I believe, however, that in a large number of tubal abortions, the entire ovum surrounded by blood clot, may be found in the lumen of the tube and I have two specimens in which the ovum is partly extruded from the tube and in which careful serial sections demonstrated that the fimbriae were not injured at all.

DR. EDWARD P. DAVIS.—Two clinical points: does not the absorption of the proteolytic ferment in tubal and rupturing pregnancy predispose to shock? Is not that one of the causes of shock out of proportion to hemorrhage? Second, the character of the pain as the muscular layers of tube rupture, is important clinically. I recall a case which went to a fatal termination through shock, where operation disclosed a minimum hemorrhage and where two distinct accessions of pain could be traced to successive rupture of muscular layers of the tube. I do not think that

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we should get the idea that rupure of tubal pregnancy comes with great suddenness, as a *tour de force*. The gradual pain, with increasing shock, seems to me to be the essential clinical picture.

DR. McDONALD (closing).—There is no doubt, as Dr. Davis says, that ectopic rupture is not a sudden process, as a rule. As regards the shock from proteolytic ferment, I do not know the amount of the ferment, but it is probably very small. In ectopic pregnancy the degree of shock is sometimes rather diverse from the amount of blood lost. The question of hemorrhage between the coats has not been described except by Bonney, although hemorrhage into sinuses of the gestation itself has been long recognized, but the fact of intramural extravasation of blood between the coats has never been referred to, except by Bonney. Hemorrhage from the nourishing blood lake itself has been recognized but not dissecting hemorrhage between the coats. At least I am unfamiliar with it. I have never seen the gestation begin in the lumen of the tube itself. As described by Dr. Schumann, this covering up by the mucosa occurs in the uterus, but never has been described by any one as occurring in the tube. I have seen one scar and it is very difficult to find even in tube where the ovum has passed. I have suggested an alteration of the nomenclature, not with a view of upsetting any old nomenclature, but with the idea of correlating symptoms and pathology more exactly. The first accident of tubal pregnancy, intramural extravasation of blood between the muscular coats of the tube wall, should have some expression in the terminology. The old terms of tubal abortion and tubal rupture are inexact and misleading as to the pathology. Fimbrial rupture, is a better term than tubal abortion, because that implies that rupture comes from the mucosal canal. No doubt in many cases it does not. Transperitoneal rupture is what Bonney calls extratubal rupture under the old terminology, tubal rupture which is not truly tubal as it only bursts through the outer coat of the tube.

NEW YORK ACADEMY OF MEDICINE

SECTION ON OBSTETRICS AND GYNECOLOGY

STATED MEETING, FEBRUARY 27, 1923.

DR. WILLIAM E. CALDWELL IN THE CHAIR

DR. LYNN LYLE FULKERSON presented a **New Cystoscope for Female Bladder and Urethra.**

This instrument is a direct vision cystoscope designed to permit examination of the female bladder and urethra by either air or water distention. It consists of four tubes of sizes 24, 27, 30, and 33 F any one of which may be adjusted to a universal light-carrier. (Fig. 1.) The tubes are 10 cm. in length and each is furnished with an obturator. The light-carrier is provided with a lock-screw for holding the tube in place, with a tube and cut-off for regulating the filling of the bladder and urethra with water, with a small opening for air escapement, and with a light-carrier base which sets into a slit-tube at the end of a nickel cord terminal. (Fig. 2.) The cord terminal serves as a handle and is provided with a switch for controlling the light. Four eyepieces are furnished, one of which is without a lens, being left open for use when operating. The other three eyepieces are closed by lenses. They are locked on the light-carrier before filling is begun. When the eyepieces are partly locked a hole is left open for air escapement; when completely locked

it is closed. The lens marked "1" produces a magnification of about twice the actual size. It has a focal length permitting clear vision for ½ inch in front of the tubes in water. It is used in examination of the urethra by water dilatation only. Lens "2" has a focal length of about ½ inch beyond the proximal end of the instrument in air and about two inches in water. It is used in examination of the bladder by water dilatation. The magnification is about 1½. Lens "3" is plane glass and is advised for routine cystoscopy and urethroscopy by water dilatation. A double catheterizing eyepiece is furnished with the instrument if especially ordered. It consists of two tubes set in metal with a window above and permits the passage of number 5 and number 6 catheters. A similar eyepiece allowing the use of waxed bougies to size 12 F is also manufactured.

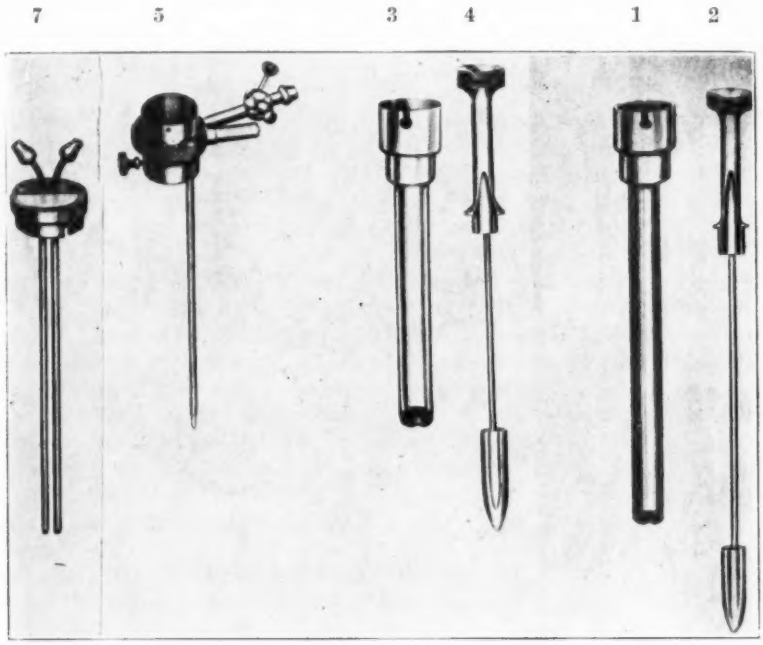

Fig. 1.

1. Cystoscopic Tube. 2. Obturator for passing cystoscopic tube. 3. Seven cm. tube for urethra. 4. Obturator for passing urethroscopic tube. 5. Light-carrier with lock-screw, light-carrier base, tube and cut-off for filling, also opening for air escapement (Fig. 2). 6. Examining eyepiece. 7. Double catheterizing eyepiece. Perforated rubber caps are used to prevent leakage. 8. Eyepiece for operating with water dilatation of the bladder. A large perforated rubber cap is used to prevent leakage around the bougie (Fig. 3). 9. (Fig. 2) Instrument assembled for use as a direct vision cystoscope or urethroscope. The cord-handle is attached.

From this description it is evident that the instrument is in reality an adaptation of the Kelly endoscope to permit the diagnosis of urethral and bladder conditions or ureteral catheterization, of fulguration by water dilatation and still leave in the hands of the operator as endoscope like the Kelly with which to make applications to the urethra or carry out operative procedures by means of air distention. Although the cystoscope may be used satisfactorily in the examination of both bladder and urethra, short tubes 7 cm. in length are provided for the operator who prefers a closer view and greater ease in diagnosing and treating diseases of the female urethra. This shortened instrument is called the urethroscope. The open eyepiece or No. 1 or No. 3, is used with the urethroscope.

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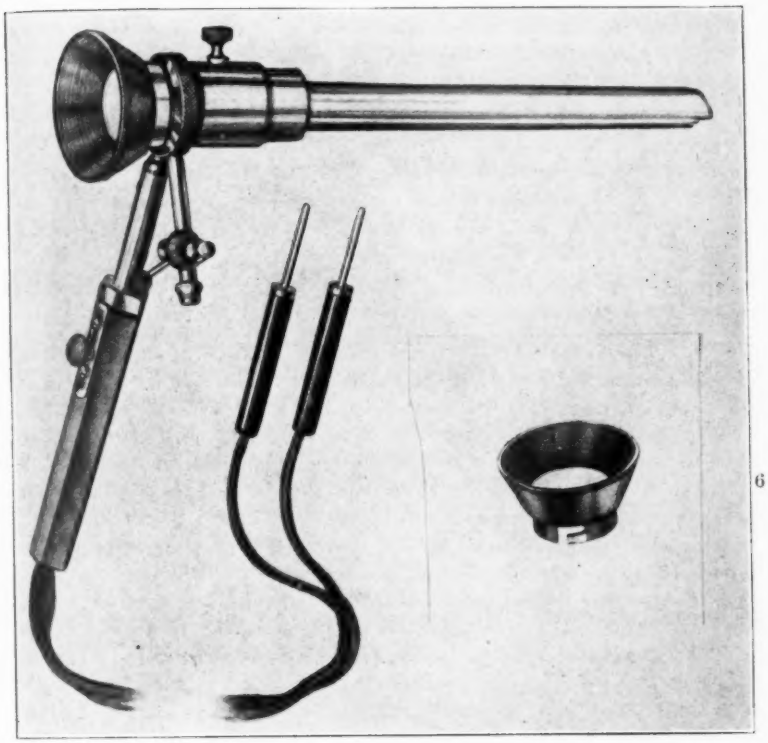

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Fig. 2.

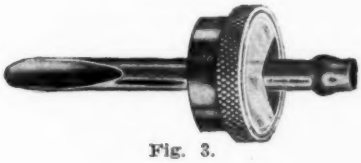

Fig. 3.

DR. WALTER TAYLOR DANNREUTHER read a paper entitled **Dextroversion of the Uterus, with Congenital Absence of Left Fallopian Tube, Ovary, Broad Ligament, Round Ligament, Kidney and Ureter.** (See page 51.)

DR. HERMAN SHARLIT read a paper entitled **Desiccated Ovary; Its Use, Preparation, and a Suggestion as to the Method of Standardization.** (See page 33.)

DISCUSSION

PROFESSOR RALPH H. McKEE: This dehydration work started as a war problem in order to find a method of dehydrating meat so that it could be exposed to the air for six months or more and then by restoring the water would be like

fresh meat. After succeeding in doing this in the laboratory it was done on a larger scale. The apparatus used is a slightly modified vacuum shelf drier. The essential phases as employed in the dehydration of meat have been applied to the preparation of glands. The temperature of the steam employed for heating the shelves, at the start is 73° C. and then 60° C. later on. The material is of course cooler, due to evaporation. The time required is about eight hours, but varies a little according to the thickness of the glands. The ovarian glands I have brought are now blood-red and essentially dry, though for complete dryness they need a little longer time. They will become a little darker brown on exposure to air, even then if soaked in water they will exude blood. If kept for six months they would still show some blood and the characteristics similar to those of the fresh product. The dessication must be done quickly and that means a good vacuum as well as the correct temperature and there must be no oxidation.

DR. WALTER T. DANNREUTHER.—While I am not qualified to discuss the various technical methods by which glandular extracts are prepared, there are two or three matters having to do with the clinical aspect of organotherapy, referred to by Dr. Sharlit, upon which I should like to comment. Very frequently endocrine therapy is condemned for no better reasons than those that the doctor has mentioned. It seems to me, however, that there is little excuse for anyone erroneously attributing a pruritis to the menopause in the presence of a diabetes mellitus, just because the patient happens to be in her climacteric period, and expecting that it will be relieved by the administration of ovarian extract, or any other extract. Permit me to suggest four reasons for unjust censure of organotherapy. First, suitable cases are not always properly selected. Second, a detailed history and careful observation of the patient's general physical characteristics, based upon a knowledge of the normal physiological manifestations of the activity of the several ductless glands, is essential. I defy any man seeing ten to thirty patients in his office in an hour to analyze his histories correctly and apply organotherapy intelligently. Third, many of the organic extracts, including ovarian, have not yet been standardized, such as pituitary. Fourth, many who write and talk on disturbances of the internal secretions are not sufficiently careful to discriminate between accepted facts and pure theories.

The importance of recognizing more or less reciprocal activity between all the glands of internal secretion should be emphasized. In the case of hot flushes and the regression of ovarian function, Dr. Sharlit has selected one of the few examples of a symptom which may be properly attributed to the dysfunction of a solitary gland. But the ovary is not the only gland responsible for menstruation; the thyroid and ovary also promote it. In most instances we find that there is a disturbance of more than one gland, and that therapy will fail if one extract alone is relied upon.

I think that the vertigo and nausea, which disappeared when Dr. Sharlit reduced the dose of ovarian extract, would have ceased after two or three days had he not done so. It has been my experience that these symptoms gradually lessen spontaneously as toleration is established, and it is unnecessary to reduce the dosage below five grains.

DR. J. J. McNULTY.—I think the trouble is that physicians try to be organotherapists while they fail to be biologists. No one can be an organotherapist who is not primarily a biologist. The interrelation between organotherapy and biology is not merely a correlation but a unified phenomenon. No one can appreciate organotherapy fully or practice it effectively unless he recognizes this unity, which is not an interrelationship but a splendid and extraordinary harmonizing system,

working with intelligent cooperation. When men spend their time differentiating the phenomena of disturbances of a single gland, they are symptomatic therapeutists, and are without biological sense, and they are not even organotherapeutists. Dr. John J. Abel pointed out that fact when he proved that a single compound like epinephrin supposed to contain a single principle is not a single principle, and showed that the action of such a principle may be entirely different in two different cases owing to the difference in the functional activity of the glands in the different individuals. It depends upon the receptivity of the subject, for epinephrin has two radicals, one positive and one negative, one causing vasodilatation and the other causing vasoconstriction. This shows that these things to which we are trying to give definitions are compound substances; we cannot make a definition, for there is no single definition which fits any one of them.

DR. SHARLIT (closing).—I made no effort to make an endocrinologic study. I was interested in finding a therapeutic principle in ovarian extracts and hit upon a symptom which was most regularly present in disturbances of the ovary. This substance relieves this symptom and I think it is one definite therapeutic principle. In studying the endocrines we must look upon the interrelationship and correlation of all the glands, but I was not concerned with that. The suggestion that I was trying to study the ovary as a distinct endocrine entity does me an injustice, for I did not attempt any endocrinological study at all.

DR. JAMES A. CORSCADEN read a paper entitled **Limitations of Radiotherapy in the Management of Fibromyoma of the Uterus.** (See page 42.)

DISCUSSION

DR. LEON T. LE WALD.—The statement has been made that stimulation sometimes occurs with underdosage of x-rays. I should like to know what Dr. Corscaden's experience has been along that line. I believe Dr. James Ewing has stated that he has never seen any proof of stimulation of a new growth by means of radiation.

DR. CORSCADEN.—The question of underdosage with x-rays and radium is one of the utmost importance. This is the only cause of unfavorable result in the patients who have been treated by others and have later come to me. They have been given 600 or 700 milligram hours of radium on the theory that they would modify menstruation without destroying the function. Some have succeeded in regulating menstruation but the patients still have their myomata. They require frequent examinations and are mentally upset. The principle which we have adopted as applicable to women with myomata of the uterus is that small doses of radium will cause more discomfort and will in the end cause a greater loss of time to the patient than if she submits to an abdominal operation. The dosage should be large enough to produce permanent amenorrhea.

DR. HAROLD CAPRON BAILEY, and HALSEY J. BAGG read a paper entitled **The Effect of Radiation on Fetal Development.** (See page 461, May issue.)

DISCUSSION

DR. HALSEY J. BAGG.—I have been interested in this subject, mainly from the biological point of view. Many physical and chemical agents may bring about

morphological changes in offspring treated during their early development. Radiation, heat, cold and chemicals may all bring about arrested development. It would seem that a certain part of the body may be slowed up in its development by a critical period, and that particular part never has the opportunity to catch up with the rest of the organism. Abnormal structure results from such arrested development.

I should like to refer to some biological work of Professor Guyer which may be of interest. He took rabbits' lenses, made an emulsion and injected it into a fowl, and then the serum from the fowl's blood was injected into pregnant rabbits and the young of these rabbits showed eye defects. There are apparently data to show that the abnormalities are inherited. I do not want you to think that the biologists are going back to the idea that acquired characteristics are inherited; I should rather have you take Dr. Corscaden's illustration of the four electrons, where one electron was eliminated from the system, for I think something analogous to that may happen to the germ plasm after exposure to irradiation.

DR. DAVID TOVEY.—I should like to ask Dr. Bailey whether he means that a pregnant woman should not be x-rayed to see whether the pelvis is normal. If an ovary were removed before the fourth month of pregnancy abortion will result, but if the ovary is removed later it does not occur. Will it injure the fetus to make roentgenograms of the pelvis to define the different positions of the fetus?

DR. L. T. LE WALD.—I should like to help answer that question. In something like 200,000 x-ray exposures for diagnostic purposes there has been a certain percentage of pregnant women in various periods of gestation in whom the examination was made for some complicating condition as a pyelitis, stone in the kidney, chronic appendicitis, or to ascertain whether a nausea was due to an associated gastric or duodenal ulcer, or to differentiate between an ovarian cyst and pregnancy. Most of these examinations were made after the fourth month. In all these cases that I have followed to term and afterward there has been no injury to the child from a properly conducted diagnostic procedure. I have no hesitation in saying that it is perfectly safe to make such an examination provided some rational amount of dosage is kept in mind.

DR. ISAAC LEVIN.—I shall not discuss the paper from the standpoint of gynecology but of the general aspects of radiology and radiotherapeutics. A great deal has been written recently on the subject of roentgenography of the pregnant uterus in order to ascertain the diameter of the pelvis. I consider it a rather hazardous undertaking.

The lymphoid tissue, the leucocytes of the blood and the thymus are extremely radiosensitive and very easily injured by comparatively small quantity of radiations. The deleterious effects of irradiation of these organs and tissues may appear only several years later and bring about an arrest in the development of the organism of the child who was irradiated in its fetal life.

Irradiation of a young or pregnant woman should be done with a great deal of care and only when a serious need for it exists. While it is true that roentgenology is of enormous help in diagnosis and in therapy, it must not be forgotten that the x-rays represent a powerful agent which may influence the whole organism.

DR. CALDWELL.—To determine whether such use of the x-rays is harmful there will have to be a long follow-up, well-conducted, of a large number of cases in which the x-rays have been used in these small doses, before it can be

proved that the diagnostic use of x-rays is dangerous. I do not imagine that Dr. Bailey and Dr. Bagg intended to bar the diagnostic use of x-rays and radiation.

DR. BAILEY, (closing).—We rather felt that the discussion would be along the lines of x-ray and radium treatment of fibroids and menorrhagia in women of the childbearing age. We believe that our warning is justified in looking over this material. We feel that these women, if radiated at all, should be radiated to complete sterility.

As regards gathering a large number of cases, of course that cannot be done in an ordinary length of time. We are now reporting the results in 3,000 cases from the literature treated for menorrhagia and fibroids, with something like 35 or 40 cases of pregnancy. If it has taken all this time to gather this small number, and some 50 per cent of these children have failed to live beyond the early period of infancy, it is futile to attempt to irradiate with the idea of having conception follow at some future time.

In regard to making x-ray examinations to find the measurements of the pelvis, we have quoted Horner's paper. He states that he has given x-rays to a total of 3000 milliampere seconds, and we think that such an amount is unjustifiable. If x-ray examination is necessary it should not be made in the early part of pregnancy. As to the thymus, we agree with Dr. Levin. We all know of infants showing pressure symptoms from an enlarged thymus that are relieved after x-ray treatment. We know also that this is true in regard to lymphoma and other like conditions. If x-rays are used in order to measure the pelvis the results may not be evident at the time of the birth of the child but they may manifest themselves later. Dr. Le Wald says he does not hesitate to make an x-ray examination on a pregnant woman, but Dr. Hirsch, at Bellevue, refuses to make such an examination, except in occasional instances. I have tried to persuade him to make a second examination in a woman who had had a cesarean section and he refused, so there are certain radiologists who feel there is harm in it, and with them we are in agreement.

Department of Reviews and Abstracts

Conducted by Hugo Ehrenfest, M.D., Associate Editor

Collective Review

Views of Primitive Peoples Concerning the Care of Cord and Placenta

By Jonathan Wright, M.D., Pleasantville, N. Y.

THE interest of the obstetricians in the primitive treatment of the umbilical cord at birth is not to be thought of as negligible, but it is secondary to the extraordinary ethnological interest which attaches to the vast mass of magical belief and practice revealed by the investigations of observers of modern primitive man in every corner of the world.

The treatment of the navel-string does not essentially differ at childbirth among primitive women from our own practice. In the Andaman Islands[89] the umbilical cord was severed by means of a Cyrena shell though now a steel blade is often used. Among the Sinaugolo "one of the mother's friends cuts the cord, which is neither tied nor twisted, with a bamboo knife at the length of the child's thigh from the abdomen."[90] The Shuswap[91] Indians of British North America cut the navel string with an ordinary sharp knife. In former days midwives used their arrow stone knives for this purpose. The navel-string was tied with a soft thread of Indian-hemp bark. By the Central Esquimaux "the afterbirth is placed deep in a crack between rocks, where the dogs cannot touch it. The navel-string is tied with plaited wing-sinews of a sea-gull, and the down of grass-seeds is put underneath. Then the navel-string is put over the nail of the thumb and cut with a sharp edged stone. Generally it falls off after five days."[92] In South Africa, "the umbilical cord it tied near the navel and cut about three inches from it."[93] In North East Asia the Chuckchee mother "ties up the navel with a string of sinew into which a few of her own hairs have been plaited. This string, of course, has been prepared beforehand and kept ready. She cuts the navel with a sharp stone which will serve her for that purpose during her whole life. The stone is simply taken from one of the skin-scrapers, and ever after that is kept in the clothes bag of the woman. The navel is left unwrapped, but is kept rubbed all the time with dry powdered coal, till at last it falls off."[94] In Northern India, the umbilical cord is cut by a blunt instrument such as a sickle which Crooke[95] thinks is responsible for the prevalence of infantile lockjaw among the infants. The jawbone and the umbilical cord of a previous King of the Baganda[96] in Africa play prominent parts in many of the royal ceremonies and the umbilical cord plays also an important rôle at the ceremony of christening or rather the naming of the child itself. In

Australia "when a man has a child born to him he preserves its umbilical cord by tying it up in the middle of a bunch of feathers. This is called a 'kalduke,' "[97] and is used in establishing some sort of a relationship or taboo with the children of the man, to whom it is given, in another tribe, which accomplishes something in the way of conferring superiority in the face of collusion between those hostile to the participants in the ceremony and the taboo. The ancient Peruvians,[98] when they cut the navel-string, at the birth of the child, left it as long as a finger, and when it fell off they preserved it with the greatest care and gave it to the child to suck when it felt ill.

It must be borne in mind that primitive man has always held tenaciously to the view that the possession by one individual of anything, belonging to or having belonged to another man, gives the one in possession an opportunity to exercise certain influences, for good or evil as he chooses, over the original owner. It may be his hunting knife or his bow, but vastly more important are his shorn hair and his nail parings. Rightly manipulated, these place in the hands of the wise, the wizard, the medicine man, all but absolute power over his life and death. The possession by another of anything so vitally important as the secundines cannot be contemplated for a moment with equanimity by any primitive mother and the question for the child, whom they enveloped and ministered to in utero, remains often in remote years a matter of extreme concern.

From the multitude of ceremonies and observances which are reported as to the placenta, it is apparent, and indeed we should naturally expect, that the function of the afterbirth is unknown, at least in any fixed and definite way, to primitive man. Therefore it is not remarkable that numerous theories should have sprung up among primitive men as to its significance. The enormous number and diversity of the ideas on the subject, the conclusions drawn from the phenomenon, as noted by Frazer[99] are compliments to the mental vigor of the human race. To make quotation at random, at the risk of repetition: After referring to the hair and nails we often hear of in the practices of negro witchcraft and deciduous teeth at great length he says: "Other parts which are commonly believed to remain in sympathetic union with the body, after the physical connection has been severed, are the navel-string and the afterbirth, including the placenta. So intimate indeed is the union considered to be, that the fortunes of the individual throughout life are often supposed to be bound up with one or other of these portions of his person, so that if his navel-string or afterbirth is preserved and properly treated he will be prosperous; whereas if it be injured or lost he will suffer accordingly."..... "In Pasir, a district of eastern Borneo, the afterbirth is carefully treated and kept in an earthen pot or basket in the house until the remains of the navel-string have fallen off. All the time it is in the house candles are burned and a little food is placed beside the pot. When the navel-string has fallen off, it is placed with the placenta in the pot, and the two are buried in the ground near the house. The reason the people take this care of the afterbirth is that they believe it able to cause all kinds of sickness and mishaps. The Malas, a low Talugu caste of Southern India, bury the placenta in a pot with leaves in some convenient place, generally in the back yard, lest dogs or other animals should carry it off, for if that were to happen they fancy

that the child would be of a wandering disposition. The Khasis of Assam keep the placenta in a pot in the house until the child has been formally named. When that ceremony is over, the father waves the pot containing the placenta thrice over the child's head, and then hangs it to a tree outside of the village. In some Malayo-Siamese families of the Patani States it is customary to bury the afterbirth under a banana-tree, the condition of which is thenceforth regarded as ominous of the child's fate for good or ill. A Chinese medical work prescribes that 'the placenta should be stored away in a felicitous spot under the salutary influences of the sky or the moon, deep in the ground, and with earth piled up over it carefully, in order that the child may be ensured a long life. If it is devoured by a swine or dog, the child loses its intellect; if insects or ants eat it, the child becomes scrofulous; if crows or magpies swallow it, the child will have an abrupt or violent death; if it is cast into the fire, the child incurs running sores.' The Japanese preserve the navel-string most carefully and bury it with the dead in the grave. Among the Gallas of East Africa the navel-string is carefully kept, sewn up in leather, and serves as an amulet for female camels, which then become the child's property, together with all the young they give birth to. The Baganda believe that every person is born with a double, and this double they identify with the afterbirth, which they regard as a second child. Further, they think that the after-birth has a ghost, and that the ghost is in that portion of the navel-string which remains attached to the child after birth. This ghost must be preserved if the child is to be healthy. Hence when the navel-string drops off, it is rubbed with butter, swathed in bark-cloth, and kept through life under the name of 'the twin' (mulongo). The afterbirth is wrapt up in plantain leaves and buried by the child's mother at the root of a plantain tree, where it is protected against wild beasts. If the child be a boy, the tree chosen is of the kind whose fruit is made into beer; if the child be a girl, the tree is of the kind whose fruit is eaten. The plantain tree at whose root the afterbirth is buried becomes sacred until the fruit has ripened and been used. Only the father's mother may come near it and dig about it; all other people are kept from it by a rope of plantain fibre which is tied from tree to tree in a circle round about the sacred plantain."..... "Such are the customs observed with regard to the afterbirth and navel string of Baganda commoners. The king's navel-string or 'twin,' wrapped in bark clothes and decorated with beads is treated like a person and confided to the care of the Kimbugwe, the second officer of the country, who has a special house built for it within his enclosure. Every month when the new moon first apears in the sky the Kimbugwe carries the bundle containing the 'twin' in procession, with fife and drum playing, to the king, while the royal drum is beating in the royal enclosure."

The supernatural aspect of the placenta finds expression in many beliefs widespread throughout the primitive races of mankind and by no means extinct among civilized men. He who is born with a caul is supposed to have certain chances in the game of life, not possessed by others. This is a belief at which we smile, perhaps, but whose very persistence significant of a past when the smile did not betray itself. "Thus in many parts of the world the navel-string, or more commonly the afterbirth, is regarded as a living being, the brother or sister of the infant, or as the material object in which the guardian

spirit of the child or part of its soul resides. This latter belief we have found among the aborigines of Queensland, the Battas of Sumatra, and the Norsemen of Iceland. In accordance with such beliefs it has been customary to preserve these parts of the body, at least for a time, with the utmost care, lest the character, the fate, or even the life of the person to whom they belong should be endangered by their injury or loss. Further, the sympathetic connection supposed to exist between a person and his afterbirth or navel-string comes out very clearly in the widespread custom of treating the afterbirth or navel-string in ways which are supposed to influence for life the character and career of the person, making him, if it is a man, a swift runner, a nimble climber, a strong swimmer, a skilful hunter, or a brave soldier, and making her, if it is a woman, an expert fisher, a cunning sempstress, a good cook or baker, and so forth. Thus the beliefs and usages concerned with the afterbirth or placenta, and to a less extent with the navel-string, present a remarkable parallel to the widespread doctrine of the transferable or external soul and the customs founded on it. Hence it is hardly rash to conjecture that the resemblance is no mere chance coincidence, but that in the afterbirth or placenta we have a physical basis (not necessarily the only one) for the theory and practice of the external soul."

Major Gurdon[100] comments on some of this as follows. "Dr. Frazer when dealing with the subject of sympathetic magic, refers to the navel-string and the placenta as parts which are commonly believed amongst certain people to remain in sympathetic union with the body after the physical connection has been severed, and it is interesting to note that in the Babar Archipelago, between New Guinea and Celebes, the placenta is mixed with ashes and put in a small basket, which seven women, each of them armed with a sword, hang up on a tree of a peculiar kind (citrus hystrix). The women carry the swords for the purpose of frightening the evil spirits, otherwise the latter might get hold of the placenta and make the child sick. Mr. C. M. Pleyte, Lecturer on Indonesian Ethnology, at the Gymnasium William III at Batavia, who has most courteously furnished me with some interesting information on this subject, states that it is especially in the Southern Moluccas that the placenta is mixed with ashes and hung in a tree. Wider spread is the custom of placing the afterbirth on a small bamboo raft in a river 'in order that it may be caught by crocodiles, incarnations of the ancestors, who will guard it till the person to whom it has belonged dies. Then the soul of the placenta is once more united with that of the dead man, and together they go to the realms of the dead. During lifetime the connection between men and their placentas is never withdrawn.' The Khasis, a'though they cannot explain the meaning of the presence of the placenta at the naming ceremony, and the care with which they remove it and hang it up in a tree, are probably really actuated by the same sentiments as the inhabitants of the Southern Moluccas, i.e., they believe that there is, as Dr. Frazer puts it, a sympathetic union with the body after the physical connection with the child has been severed. There is no fixed period of song, or taboo, after a birth, but the parents of the child are prohibited by custom from crossing a stream or washing their clothes until the navel-string falls off, for fear that the child should be attacked by the demons of the hills and the vales."

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